Five Points Fuels Reduction Project

Wildlife Specialist's Report

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Introduction

This analysis describes terrestrial wildlife species found within the 5 Points project area and other relevant scales and the potential effects of the 5 Points alternatives on these species. Rather than addressing all wildlife species, discussion focuses on Forest Plan management indicator species (MIS), threatened, endangered and sensitive (TES) species, Forest Plan featured species, and landbirds (see individual species lists below). Existing conditions are described for each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. Supporting wildlife documentation is located the Project Record, and includes detailed data, methodologies, analyses, conclusions, maps, references and technical documentation used to reach conclusions in this environmental analysis.

Regulatory Framework

The three principle laws relevant to wildlife management are the National Forest Management Act of 1976 (NFMA), the Endangered Species Act of 1973 (ESA), and the Migratory Bird Treaty Act (MBTA) of 1918 (as amended). Direction relative to wildlife is as follows:

- NFMA requires the Forest Service to manage fish and wildlife habitat to maintain viable populations of all native and desirable non-native vertebrate wildlife species and conserve all listed threatened or endangered species populations (36 CFR 219.19).
- ESA requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. Forests are required to consult with the US Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species.
- MBTA established an international framework for the protection and conservation of migratory birds. This Act makes it illegal, unless permitted by regulations, to "pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird."

Forest Service Manual (FSM) direction provides additional guidance: identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species (FSM 2670.31 (6)).

The Forest Service Manual also directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. Under FSM 2670.32, the manual gives direction to analyze the significance of adverse effects on a species habitat or population within the area of concern, and on the species as a whole.

The principle policy document relevant to wildlife management on the Forest is the Wallowa-Whitman Land and Resource Management Plan (USDA Forest Service 1990), referred to as the Forest Plan for the remainder of this analysis. The Forest Plan provides standards and guidelines for management of wildlife species and habitats. Standards and guidelines are presented at the Forest level (LRMP, pp. 4-18 to 4-56) or Management Area level (LRMP pp. 4-56 to 4-98).

The 1995 Regional Forester's Eastside Forest Plan Amendment #2 (Eastside Screens) amended Forest Plans for the National Forests in Eastern Oregon and Eastern Washington, including the Wallowa-Whitman National Forest. Amendment # 2 established interim wildlife standards for old growth, old growth connectivity, snags, large down logs, and northern goshawks. The Regional Forester has periodically distributed letters clarifying direction in Amendment #2 (Regional Forester, October 2, 1997; October 23, 1997; and June 11, 2003).

Additional management direction provides for conservation of migratory landbirds. This direction is consolidated in the Forest Service Landbird Strategic Plan and further developed through the Partners in Flight Program. The Oregon-Washington Partners in Flight Conservation Strategy for Landbirds in the Rocky Mountains of Eastern Oregon and Washington (Altman and Bressen 2017) identifies priority habitats, and focal species and habitats for the Blue Mountains of Oregon.

Analysis Methods

Different scales of analysis are used to analyze the effects of the treatment activities on wildlife, and include the following:

- 5 Points Project Area perimeter at 4,638 acres on National Forest System lands
- The watershed scale provides a systematic way to understand and organize ecosystem information
- Forest scale at which population viability is assessed
- Blue Mountains Ecological Province
- The cumulative effects area encompassing the 5 Points Project Area varies by species and is described within sections dedicated to individual species analyses

The project area boundary occurs within the 5 Points Creek watershed. Management Indicator Species population viability assessments have been conducted for Pacific marten, Pileated Woodpecker, and Northern Goshawk at the Blue Mountains and Wallowa-Whitman National Forest scales (Wales 2011a,Wales 2011b, Wales2011c).

Existing condition describes each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. We disclose incomplete or unavailable information and scientific uncertainty where applicable.

Management Indicator Species (MIS)

The geographic ranges of MIS are larger than the project area, thus the analysis of habitats for viable populations of MIS needs to be done at a scale larger than the individual project. "Habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species generally throughout its current geographic range" (FSM 2620.1). Provisions for contributing to viable populations are determined at the level of the Forest Plan through management requirements, goals and objectives, standards, guidelines, prescriptions, and mitigation measures to ensure that habitat needs of MIS will be met during plan implementation at the project level (FSM 2621.4). Analysis for each MIS includes an assessment of consistency with the provisions identified in the Forest Plan. Cumulative effects of proposed management activities on habitat capability for MIS are evaluated (FSM 2620.3) and we use best available science in this analysis in assessing project impacts.

Analysis Tools and Surveys

Species presence/absence determinations are based on habitat presence, current surveys, past wildlife surveys, recorded wildlife sightings, the Oregon Natural Heritage Information Center wildlife sightings database (2008), scientific literature, and status/trend and source habitat trend documented for the Interior Columbia Basin (Wisdom et al. 2000).

Vegetation analysis and estimates of stand conditions used silviculturist field data, aerial photo interpretation, vegetation database, and/or ground reconnaissance.

Analysis Methodology

Alternative 1, the No Action Alternative is used as a benchmark to compare and describe the differences and effects between taking no action and implementing action alternatives. The No Action Alternative represents the existing condition; resource conditions are then projected forward in time to estimate resource changes expected in the absence of the proposed management activities.

Effects on species will be determined by assessing how the no action alternative and action alternatives affect the structure and function of vegetation relative to current and historical distributions. Some wildlife habitats require a detailed analysis and discussion to determine potential effects on a particular species. Other habitats may either not be impacted or are impacted at a level which does not influence the species or their occurrence. The level of analysis depends on the existing habitat conditions, the magnitude and intensity of the proposed actions, and the risk to the resources.

Management indicator species (MIS)

The LRMP identifies five wildlife species, or groups of species, as MIS (Table 1) (US Forest Service 1990). These species serve as indicators of the effects of management activities by representing habitat for a broad range of other wildlife species. We assume that habitat requirements of MIS represent those of a larger suite of species using the same type of habitat. All MIS are present in the project area.

Table 1. MIS and their primary habitats.

Species	Habitat

American marten	Old-growth and mature forest
Northern Goshawk	Old-growth and mature forest
Pileated Woodpecker	Old-growth and mature forest
Primary cavity excavators[1]	Snags and logs
Rocky Mountain elk	Cover and forage

[1] Northern Flicker; Black-backed, Downy, Hairy, Lewis', Northern Three-toed, and White-headed Woodpeckers; Red-naped and Williamson's Sapsuckers; Black-capped, Chestnut-backed, and Mountain Chickadees; and Pygmy, Red-breasted, and White-breasted Nuthatches

Rocky Mountain Elk

Rocky Mountain elk are an indicator of habitat diversity, interspersion of cover and forage area, and security habitat provided by areas of low human disturbance. Elk management on the Wallowa-Whitman National Forest is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU). The 5 Points project lies within the Mt. Emily WMU.

Background

Rocky Mountain elk (*Cervus canadensis nelson*- hereafter elk) are an important big game species in northeastern Oregon (Csuti et al. 2001) and are an indicator of the quality and diversity of forested habitat (defined as ≥ 40% canopy closure, USDA LRMP 1990). Other big game species (i.e. mule deer, white-tailed deer, black bear, and cougar) as well as many non-game species are at least partially accommodated when high quality elk habitat is present. Elk exploit a variety of habitat types in all successional stages and their patterns of use change daily and seasonally (Ager et al. 2003). Summer diet consists of deciduous shrubs (Cook et al. 2016), graminoids, and forbs (Faber 2017). In winter, elk select for graminoids, browsing on woody plants if available forage and winter severity reduce access to grazing (Christianson and Creel 2007). They are responsive to land management activities, thus the density or health of elk populations (as opposed to examining population trends) most likely indicate the effectiveness of elk management. (Toweill and Thomas 2002).

Two major factors contributing to elk habitat quality are cover/forage and open roads – these factors are discussed throughout the elk section of this report. Thinning and prescribed fire result in an increase in available forage (Long et al. 2008), but Cook (et al. 2016) found that merely thinning mid-seral stands was not an effective to increase forage. Habitat management activities must reset stands to an early seral stage to increase forage quantity and quality for elk. Displacement of elk from areas during intensive management activities is well documented, but research shows the displacement is temporary (Toweill and Thomas 2002, Wisdom et al. 2005).

Increased road densities significantly reduces elk security habitat (Toweill and Thomas 2002, Ranglack et al. 2017), increases individual stress levels (Creel et al. 2002), increases elk vulnerability from legal and illegal hunter harvest (Rowland et al. 2005), and changes the distribution of elk populations across the landscape (Ciuti et al. 2012, Wisdom et al. 2005). These factors will be revisited in the discussion of the direct and indirect effects of each alternative.

Blue Mountain/Wallowa-Whitman Population Viability

The National Forest Management Act (1976) requires land managers to provide sufficient habitat to provide for viable populations of all native and desired non-native vertebrates. As a game species, elk are managed on a management objective (MO) basis. Management objectives were developed to consider not only the carrying capacity of the lands, but also the elk population size that would provide for a huntable surplus, and tolerance levels of ranchers, farmers, and other interests that may sometimes compete with elk for forage and space. Biologically, a population that is managed around a MO is much larger than the smallest population size that can persist over the long term. Elk populations on the Wallowa-Whitman are regulated by hunting and predation.

Methods

We use a habitat effectiveness index (HEI; Thomas et al. 1988) assessing the quality of elk habitat at the project area level. This model considers the density of open roads, the availability of cover habitat, the distribution, and juxtaposition of cover and forage, and forage quantity and quality. Forage data is unavailable for this project area and is omitted from the total HEI value. This report also employs the use of distance band analysis (DBA) to determine the effects of roads on elk security habitat (Rowland et al. 2005). The impacts of OHV's on closed roads and cross-country travel are not considered in an HEI analysis, although they likely cause reduction in habitat effectiveness. Additionally, a discussion of the best available science accompanies the results.

Existing Condition

The 5 Points project area falls within the Mt. Emily WMU (ODFW) contained within the Wallowa Zone. As of 2019, the population was at 56.1%. of the MO of 5700. Though this is well-below the MO, the population has been reliably ~3,100 for the past 10 years.

The Forest Plan establishes standards for wildlife habitat, and more specifically elk habitat on the Forest. The 5 Points analysis area, 24,780 acres in size, providing year-round habitat for big game. Of the 24,814 acres within the analysis area, 10,651 acres are designated MA 3A and 8,189 acres are MA 3, managed for timber production with a special emphasis on optimal cover and forage for big game species. Another 3,391 acres are MA 1, 922 are MA 1W, which emphasizes wood fiber production while meeting needs for animal forage and recreation. 743 acres are MA 15, managed for old growth, and a nominal amount of acres are miscellaneous MA categories.

Cover

The designated MA 3A and MA 3 are managed with a greater emphasis on providing quality habitat for big game species. Forest directives are complex regarding management of MA 3 and MA 3A.

Vegetation manipulation that converts a site from satisfactory or marginal cover to a forage condition should:

- <u>For MA 3</u>: Have at least 80% of the treated area within 600 ft of a patch of satisfactory cover at least 40 acres in size.

- <u>For MA 3A:</u> Have at least 80% of the treated area within 600 ft of a patch of satisfactory or marginal cover at least 6 acres in size AND within 900 ft of a patch of satisfactory cover at least 40 acres in size.

Within MA 3 and MA 3A, <80% of proposed treatments will convert satisfactory (canopy cover >70%) or marginal cover (canopy cover <70%, >40%) to forage condition (canopy cover <40%). In dry forest types, 70% canopy cover is often not feasible, resilient, or in alignment with HRV, creating discussion points in final analysis.

A cover: forage ratio is used to describe the relative amounts of stands with >40% cover to stands <40% cover. The optimal ratio of cover to forage is 40:60 (Thomas 1979), but the LRMP establishes a minimum standard that at least 30% of forested land be maintained as cover (>40% canopy closure). Per Thomas 1988, cover refers to any combination of satisfactory cover (a stand of coniferous trees with >70% canopy closure) and marginal cover (a stand of coniferous trees with 40-70% canopy closure). Forage habitat is less than 40% canopy cover. Research has shown that this definition of cover may not be precise - not all stands with cover >70% are satisfactory in terms of elk forage and energy expenditure (Cook et al. 1995).

The existing cover: forage ratio in this project area is 53.7:46.3 (Table 2). This ratio exceeds the LRMP standard, suggesting a shortage of forage habitat. Stand data was collected in the early 80's and the ratio may misrepresent the cover: forage analysis area based on changed conditions due to disturbances or seral progression.

Table 2 – Although treatments in each alternative would affect cover type differently, the overall differences between alternatives are minimal.

	Existing Condition	
Cover and Forage Classification	**Acres**	**% of Total**
Forage acres (< 40% canopy cover)	11,473	46.3
Marginal Cover acres (> 40%, < 70% canopy cover)	5,352	21.5
Satisfactory Cover acres (> 70% canopy cover)	7,979	32.2

Cover Quality

Forests stands with relatively closed canopies function as thermal and security cover, providing a visual barrier from predators, and may reduce the effects of ambient temperature, wind, and long and short wave radiation functions on energy expenditure (i.e. increased metabolic rates) in elk (Thomas 1979, Thomas 1988). Although the benefits to elk of "thermal cover", in the true sense of the word, has been questioned (Cook et al. 1995, Cook et al. 1998, Bender and Cook 2005), the intent of the standard in managing elk habitat remains credible in that habitat attributes can be influential to energy balances by affecting forage quality and quantity, and mediating energy expenditures associated with travel and harassment (Bender and Cook 2005). By implementing the current "thermal cover" standard, resource managers are providing physical barriers that minimize the negative effects of human disturbance.

There are 7,979 acres (32.2%) of satisfactory cover, 5,352 acres (21.6%) of marginal cover and 11,473 acres (46.3%) of forage habitat within the analysis area resulting in a cover quality value of 0.8 (Table 3).

Size and Spacing

Thomas et al. (1979) suggest that size and spacing of cover and forage habitat is a key to elk use of forested habitat, and this assumption was verified by Leckenby (1984) in the Blue Mountains of northeastern Oregon. Size and spacing of habitat is considered optimal when cover to forage edge widths are between 100-200 yards (Thomas et al. 1988). Considering an HE value of 1 is optimal, an HE size and spacing value of 0.83 (Table 4) indicates that forage to cover ratios within the analysis area is adequate.

Open Roads

High security habitat, located greater than 1.5 miles from a road, is abundant (981 acres) and located largely at the northern end of the analysis area, away from the proposed treatment area. There is also a smaller patch of high security habitat located adjacent to the proposed treatment area, but displacement due to human activity should be limited to the window of time on which active treatment occurs. Additionally, Three Cabin TMA was established in the 1980s and a gate was installed in the project area, but this TMA has never been enforced and would vastly improve high security habitat in critical times of the year.

Excessive open road densities have negative impacts on habitat effectiveness by decreasing acres of land dedicated to habitat (1 road mile equals 4 acres of land) and increasing human disturbance to elk (Rowland et al. 2005). The existing average open road density within the 5 Points analysis area is 1.48 mi/mi^2 (Table 4). Of the 24,814 acres within the analysis area, 10,651 acres are designated MA 3A with 1.0 mi/mi^2 of road density, 8,189 acres are MA 3 with 1.7 mi/mi^2 of road density, and 922 are MA 1W with 2.7 mi/mi^2 of road density (Table 3). Another 3,391 acres are MA 1 with an average open road density of 2.4 mi/mi^2 is lower than the forest plan guideline of 2.5mi/mi^2 for MA-1 (Table 3). These road density estimates do not take into account off-road vehicle use on OHV trails, cross-country travel, and closed roads.

Table 3 – Current road density within the analysis area based on Management Area compared to LMRP direction.

Management Area	Existing Condition	LMRP Direction
1	2.4 mi/mi^2	≤2.5 mi/mi^2
1W	2.7 mi/mi^2	≤1.5 mi/mi^2
3	1.7 mi/mi^2	≤1.5 mi/mi^2
3A	1.0 mi/mi^2	≤1.5 mi/mi^2

An important finding from the Starkey Experimental Forest and Range studies is that road density is not the best predictor of habitat effectiveness for elk. Instead, a method using distance bands proved to be a more useful tool for assessing effects from roads. Road densities do not provide a spatial depiction of how roads are distributed on the landscape (Rowland 2005), but a distance band analysis (DBA) does. A DBA uses GIS to draw concentric bands around motor vehicle routes until the entire area of interest (in this case the 5 Points analysis area) is occupied by these bands. The distance band closest to motor vehicle routes (within one half mile) provides the least secure habitat for elk. As a result, elk choose to spend less time within one half mile of motor vehicle routes. As distance from motor vehicle routes increases, so does habitat effectiveness for elk. Elk find more security from human disturbance further from motor vehicle routes. moderate quality security habitat occupies the area between one-half and one mile from a road, and high security habitat occupies areas farther than 1.5 miles from a road.

For this analysis, the percentage of the landscape within each distance band was used as a means of comparing alternatives with regard to the effects of motor vehicle disturbance to elk. Existing conditions demonstrate 53.7% of habitat as moderate to high security and 46.3% of habitat as low security (Table 5). The Mt. Emily Roadless Area, immediately to the north of the project area, may provide a suitable amount of secure habitat in the vicinity.

Habitat Effectiveness Index Results

The existing condition HEI values are 0.71 (road density analysis; Table 3) and 0.66 (distance band analysis; Table 5). Although these HEI values are moderate, road density, and lack of secure habitat contribute are the reason the project area doesn't have high HEI values.

Table 4. Habitat-effectiveness index calculations for elk habitat existing conditions within the 5 Points analysis area[1]

Habitat Effectiveness Variable	Habitat Effectiveness Value (Optimal = 1.0)	Comments
HE Cover	0.80	Amount of satisfactory cover relative to marginal cover
HE Size and Spacing	0.83	Mosaic of cover and forage, 50.6:49.4
HE r value using road density	0.54	Open road density 1.48 mi/mi sq LRMP MA-1 ≤ 2.5 mi/mi sq
HE r value using distance bands	0.43	Concentric bands around open roads
Total HEI using road density[1]	0.71	LRMP MA-1 ≥ 0.5 HEI
Total HEI using distance band analysis*	0.66	LRMP MA-1 ≥ 0.5 HEI
Percent of area ≥ 0.5 mi from open motorized route	25.1	Security habitat

[1] HEI calculations do not include a forage variable because current, reliable forage data are not available

Table 5. Distance of habitat from open roads within the subwatersheds that compose the analysis area. Moderate and high security habitat are preferred for elk management. No difference in road management between Existing Condition and Alternative 2 resulted in identical distance band analysis results.

Distance Bands by Subwatershed Upper 5 Points Creek:	Existing Condition	
Distance (miles)	**Acres**	**% of Total Area**
0.5 mi (low security)	8244.6	63.6

1 mi (moderate security)	3959.9	30.5
1.5 mi (high security)	767.9	5.9
Lower 5 Points Creek:		
Distance (miles)	**Acres**	**% of Total Area**
0.5 mi (low security)	10213.1	87.3
1 mi (moderate security)	1278.3	10.9
1.5 mi (high security)	212.6	1.8
Combined (Entire Project Area):		
Distance (miles)	**Acres**	**% of Total Area**
0.5 mi (low security)	18561.2	74.9
1 mi (moderate security)	5238.1	21.1
1.5 mi (high security)	980.6	4.0

Direct/Indirect Effects for Rocky Mountain Elk

ALTERNATIVE 1

There will be no immediate direct or indirect adverse effects to elk cover and forage from Alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. The no action alternative would maintain current conditions for elk habitat in the short-term (0-20 years). How elk habitat changes in the mid to long-term (beyond 20 years) would depend largely on the occurrence and scale of disturbances (wildfire, insect, or disease), stressors (drought, global climate change), and changes in management of travel and hunting. These events cannot be predicted with a reasonable level of certainty, but risks associated with forgoing management actions can be described.

Cover-Forage

As described in Existing Conditions, there are 7,979 acres (32.2%) of satisfactory cover, 5,352 acres (21.6%) of marginal cover and 11,473 acres (46.3%) of forage habitat within the analysis area resulting in a cover quality value of 0.8 (Table 4). A study conducted by Wisdom and Rowland (2020) found that elk use is highest at 35% canopy cover, roughly 40% of the 5 Points Project Area. However, recent research demonstrates that timber stands in the Southern Blue Mountains, regardless of potential vegetation group (PVG) or moisture regime, are 273-316% more dense and contain 60-176% higher basal area currently than in the late 1800s (Johnston et al. 2018). Treatments that transition stands with canopy cover >40% to forage (canopy cover <40%) may benefit elk forage quality and quantity.

Data supports that this no action scenario could result in a higher risk of tree mortality exists due to increased competitive stress, insect outbreaks, fuel loading, and associated increases in fire severity and crown fire spread (Hessburg and Agee 2003, Spies et al. 2006, Keane et al. 2018). Landscapes that better reflect HRV result in mixed severity fires, creating a patchy mosaic of cover types beneficial to elk. Large scale, severe-intensity fire (a result of no action) would degrade elk habitat through a loss of habitat in the near-term, and a reduction in edge habitat between cover and forage areas in the long-term.

Security

As described in the Existing Conditions, 53.7% of habitat is moderate to high security and 46.3% of habitat is low security (Table 4).

Habitat Effectiveness Index

The HEI values for Alternative 1 are identical to the Existing Condition results. They are 0.71 (road density analysis; Table 3) and 0.66 (distance band analysis; Table 3).

ALTERNATIVE 2

Cover-Forage

Existing conditions demonstrate a surplus of cover with limited forage. All action alternatives meet or exceed LRMP standards for amount of stands with cover >40%. Cook (et al. 2005) found that excessive dense cover did not benefit elk and that land manager effort is better spent improving forage quantity and quality. This is accomplished by creating stands <40% cover and setting them back to an early seral stage (Cook et al. 2016).

Alternative 2 treats 1,469 acres. Commercial treatment is planned on 568 acres with 901 acres of non-commercial treatment. Both will reduce satisfactory and marginal cover (Table 6), but this will in turn improve the arrangement of forage and cover. Commercial harvest would generally increase available elk forage by reducing canopy cover. Commercial treatments are arranged adjacent to privately-owned land, addressing fire risk issues, and minimize impact to higher security elk habitat to the north.

Post-treatment tree densities are expected to be variable, consisting of dense patches interspersed with open areas, but commercial thinning will overall convert marginal cover to forage. The estimated forage, marginal, and satisfactory cover are evaluated at a coarse scale and do not reflect the fine scale mosaic of cover types that result from thinning prescriptions.

Table 6 – Although treatments in each alternative would affect cover type differently, the overall differences between alternatives are minimal.

	Existing Condition		Alternative 2	
Cover and Forage Classification	**Acres**	**% of Total**	**Acres**	**% of Total**
Forage acres (< 40% canopy cover)	11,473	46.3	11,726	47.4
Marginal Cover acres (> 40%, < 70% canopy cover)	5,352	21.5	5,250	21.2
Satisfactory Cover acres (> 70% canopy cover)	7,979	32.2	7,772	31.4

Security

The HEI model developed by Thomas et al. 1998 relies on open road density as an indicator of relative effects from roads on elk habitat. More recent research in northeastern Oregon found that road density is a poor indicator of habitat effectiveness (Rowland et al. 2000). In contrast to Thomas et al., this study described a strong linear increase in elk use as the distance from roads increased. Therefore, a method using a distance banding approach, as described by Rowland et al. (2005) is used here as an alternate indicator of road effects on elk habitat in the 5 Points project area (Table 4). There will be no road closures proposed in Alternative 2; temporary road construction for project work will only be used by contractors and will be closed upon completion of the project.

Table 7. Distance of habitat from open roads within the subwatersheds that compose the analysis area. Moderate and high security habitat are preferred for elk management. No difference in road management between Existing Condition and Alternative 2 resulted in identical distance band analysis results.

Distance Bands by Subwatershed Upper 5 Points Creek:	Existing Condition		Alternative 2	
Distance (miles)	**Acres**	**% of Total Area**	**Acres**	**% of Total Area**
0.5 mi (low security)	8244.6	63.6	8244.6	63.6
1 mi (moderate security)	3959.9	30.5	3959.9	30.5
1.5 mi (high security)	767.9	5.9	767.9	5.9
Lower 5 Points Creek:				
Distance (miles)	**Acres**	**% of Total Area**	**Acres**	**% of Total Area**
0.5 mi (low security)	10213.1	87.3	10213.1	87.3
1 mi (moderate security)	1278.3	10.9	1278.3	10.9
1.5 mi (high security)	212.6	1.8	212.6	1.8
Combined (Entire Project Area):				
Distance (miles)	**Acres**	**% of Total Area**	**Acres**	**% of Total Area**
0.5 mi (low security)	18561.2	74.9	18561.2	74.9
1 mi (moderate security)	5238.1	21.1	5238.1	21.1
1.5 mi (high security)	980.6	4.0	980.6	4.0

Habitat Effectiveness Index

Results from the HEI analysis are nearly identical to the Existing Condition (Table 8). Total HEI was 0.66 for both scenarios. HEI size and spacing changes by 0.01, effectively no difference, between the no action and action alternatives. Marginal cover composes 21.2% and satisfactory cover composes 31.4% of the analysis area with alternative 2. With no road closures in the action alternative, we observed no effect on Total HEI in terms of habitat security.

Table 8. Habitat-effectiveness index calculations for elk habitat under Alternative 2 within the 5 Points analysis area[1]

Habitat Effectiveness Variable	Habitat Effectiveness Value (Optimal = 1.0)	Comments
HE Cover	0.80	Amount of satisfactory cover relative to marginal cover
HE Size and Spacing	0.82	Mosaic of cover and forage, 52.6:47.4
HE r value using road density	0.54	Open road density 2.13 mi/mi sq LRMP MA-1 $\leq$ 2.5 mi/mi sq

HE r value using distance bands	0.43	Concentric bands around open roads
Total HEI using road density[1]	0.71	LRMP MA-1 ≥ 0.5 HEI
Total HEI using distance band analysis*	0.66	LRMP MA-1 ≥ 0.5 HEI
Percent of area ≥ 0.5 mi from open motorized route	25.1	Security habitat

[1] HEI calculations do not include a forage variable because current, reliable forage data are not available

Cumulative Effects for Rocky Mountain Elk

Effects of past human activities and naturally occurring events on Wallowa-Whitman lands have been incorporated into the existing conditions for elk habitat in the project area. Direct and indirect effects of each alternative and foreseeable consequences are discussed in the preceding section. Management activities that may occur within the 5 Points project area include: the Wallowa-Whitman Travel Management Plan, the Wallowa-Whitman Invasive Species Management Plan, and the Blue Mountains Forest Plan Revision. Ongoing activities including firewood cutting, grazing, prescribed fire, noxious weed control, Idaho Power R.O.W. maintenance, road maintenance, and both motorized and non-motorized recreation have all been evaluated and are not expected to contribute measurable effects for elk.

Conclusion

All action alternatives are consistent with LRMP standards and guidelines pertaining to elk. Treatments proposed under the action alternative are expected to maintain or slightly improve elk habitat effectiveness, as indicated by HEI values, mostly due to an increase in forage. Secure habitat is located in the north section of this study area, with potential for large amounts of secure habitat in the adjacent Mt. Emily Roadless Area.

Old Growth Habitat: American Marten, Northern Goshawk, and Pileated Woodpecker

Introduction

Multi-scale understanding of ecosystems is fundamental to management (Hobbs 2003). The choice of spatial scale must be based on the species' relationship with the landscape and should consider the scale at which to apply our results for management purposes. Wildlife habitat is commonly analyzed at the watershed scale because it provides a systematic way to understand and organize ecosystem information and thus enhances the ability to estimate direct, indirect, and cumulative effects of management activities (Regional Interagency Executive Committee 1995). However, the watershed scale may be too fine to analyze viability for wide-ranging species' unless it can be placed within the broader context of how the watershed contributes to overall species viability (Regional Interagency Executive Committee 1995).

The American marten, northern goshawk, and pileated woodpecker are MIS of old growth habitat (U.S. Forest Service 1990). Impacts within the 5 Points project area are determined by analyzing effects to their habitat at several spatial scales starting with the project level then framing that within the context of the watershed and the Wallowa-Whitman National Forest. These scales take into account the species' relationship with the landscape as well as being practical for management purposes. MIS population viability assessments have been conducted for American marten, pileated woodpecker, and northern goshawk at the Blue Mountains and Wallowa-Whitman. These assessments are incorporated by reference within the existing condition and effects analysis for each species. For more in-depth information on the methodology behind these assessments, please refer to the full-length assessments in the project record and the associated peer-reviewed literature scales (Penninger and Keown 2011a, Penninger and Keown 2011b, Penninger and Keown 2011c).

The following describes the existing conditions and effects of the 5 Points project on three old growth management indicator species:

Section I – American Marten
Section II – Northern Goshawk
Section III – Pileated Woodpecker

I. Pacific Marten (*Martes caurina*)

Background

Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the American Marten Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011a). Portions of that assessment are summarized below.

The Pacific marten (*Martes caurina,;* hereafter marten*)* is associated with mature, mesic coniferous forests and is one of the most habitat-specialized mammals in North America (Bull and Heater 2001). Marten require complex physical structure in the forest understory created by lower branches of trees, shrubs and coarse woody debris (Buskirk and Ruggiero 1994, Bull and Heater 2000). Research found marten in northeastern Oregon using large-diameter hollow trees and logs, accumulations of coarse woody debris, and trees with brooms for denning and resting sites (Bull and Heater 2000). 70% of martens in eastside mixed conifer forests used snags > 23.9" dbh for denning and resting and downed wood > 20.7" dbh for denning, resting and foraging (Mellen-Mclean et al. 2017).

Broad-Scale Habitat Assessments

Wales (2011) used Bayesian Belief Network (BBN) Models to conduct viability assessments for various wildlife species of interest at the Blue Mountains and Wallowa-Whitman scales, including American marten. Using a threshold of 60% canopy closure and large tree structure of 20 inches in Cold Moist and Cold Dry Potential Vegetation Groups, Wales compared current habitat conditions to those estimated to have occurred historically. The threshold of >40% of the historical amount of source habitat in a watershed was used to identify watersheds with a relatively high amount of source habitat that would contribute to species viability. Watersheds that contain > 40% of the estimated historical median amount of source habitat (1,136 acres) are believed to provide for habitat distribution and connectivity, and better contribute to species viability across the Forest.

Historically, marten habitat was broadly distributed and of high abundance, and marten were well distributed within the mixed conifer forests of the Blue Mountains. The abundance and distribution of habitat likely provided for a high degree of connectivity within the elevations and forest cover types that provided source habitat for martens. Currently, marten habitat is more abundant in some parts of the Blue Mountains and less abundant in others, but less contiguous than historically. Currently marten habitat is broadly distributed and of high abundance, but there are gaps where suitable environments are absent or only present in low abundance.

Table 9. Historical and current marten habitat identified by Wales (2011)

	Historical Habitat (acres)	**Current Habitat (acres)**	**Percentage of Historical Habitat**
Regional Scale (Blue Mountains)	277,715	257,942	93%
Wallowa-Whitman NF scale	144,347	129,943	90%

Existing Condition

5 Points Watershed

The 5 Points project area lies within the 5 Points watershed, with the vast majority of the project area contained within the Upper and Lower 5 Points subwatersheds. These subwatersheds contain 5,068 acres of marten source habitat (habitat that can support a stable or increasing population of marten). This watershed shows the impacts of past management activities which resulted in reduction of marten habitat. The 5 Points watershed provides ≥ 40% of the median amount of source habitat that occurred historically (Wales 2011).

5 Points Project Area

Primary source habitat for marten is defined as habitat within moist and cold upland forests in the LOS stage with ≥ 60% canopy closure and ≥ 20" dbh as the tree size. According to a GIS query, the 5 Points analysis area contains 5,068 acres of source habitat, which comprises 41.4% of the potential marten source habitat. Remote sensing cameras were used in the summer of 2017 and 2018 in areas identified as marten habitat. Source habitat conditions are primarily distributed on north facing slopes in the norther portion of the analysis area between Green Mountain and Mt. Emily. Modeled source habitat, remote cameras, and past research were all taken into account in our analysis.

Pacific marten habitat was designed into the 5 Points project area to maximize the retention of high canopy cover habitat on north facing slopes and within identified areas of important connectivity. In specific areas proposed silviculture treatments were dropped or modified to retain higher canopy cover.

Direct/Indirect Effects for American Marten

ALTERNATIVE 1

There will be no direct adverse effects to marten from Alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. Existing marten source and secondary habitat would remain unchanged. The project area would continue to increase in risk to uncharacteristic insect outbreaks and fire that has the potential to degrade connectivity for marten between watersheds.

ALTERNATIVE 2

In general, commercial treatments have the potential to affect marten habitat suitability by reducing stand canopy closures and understory tree densities and simplifying the structural complexity. This could expose marten to higher predation risk, reduce foraging opportunities and potential denning habitat. Habitat after a commercial treatment would not be expected to function as source habitat and potentially not as foraging habitat in the medium term (0-50 years) before canopy cover increases and heterogeneous structure returns. Commercial treatments proposed under alternative 2 would treat 106 acres (2.1%) of existing source habitat found within the project area (Table 8).

Application of fuel treatments outside of stands proposed for timber harvest has the potential to reduce understory and down wood densities, but is unlikely to substantially reduce stand canopy closures. Moriarty (2014) compared marten movement within open, simple stands resulting from fuels treatments and untreated complex stands. She found that marten selected home ranges with a disproportionate amount of complex stands and avoided openings. Simple stands were marginally avoided compared to complex stands. Marten movement within simple stands vs. complex stands suggests that marten use simple stands for travel and for intermittent foraging but not for denning. Therefore, fuels treatments are expected to degrade, but not remove, marten habitat. Alternative 2 proposes non-commercial treatment on 82 acres , or 1.6% of existing source habitat (Table 10).

Table 10. Proposed Silvicultural Treatments in Marten Source Habitat in the 5 Points Project Area.

Treatment Type by Alternative, Acres, and Percent of Total Martin Source Habitat		
	Alternative 2	
	Commercial	Non-Commercial
Acres of Marten Source Habitat	106 Acres	82 Acres
Percent of Existing Source Habitat (5,068 Acres Total)	2.1%	1.6%

Marten Habitat at the 5 Points Watershed Level

Post-treatment availability of source habitats would continue to be above the threshold of 40% of the historical amount in the 5 Points watershed under the action alternative. Post-treatment amounts of source habitat as a percentage of potential habitat would continue to be well-above (40%) the historic median of 16% described by Penninger and Keown (2011a). However, the majority of proposed commercial treatment within *potential* marten habitat is intended to encourage large tree structure in the long term. Marten connectivity has been emphasized within this project and fuels treatments are intended to create buffers to reduce fire severity and create a buffer between private and public land. Allowing natural processes to shape future structure stage in the long term, while being mindful of connectivity concerns over the short term will ensure marten can continue to use the area.

Marten Habitat at the Wallowa-Whitman Scale

Estimated habitat impacts at the project area and watershed scales (described above) are based on source habitat parameters modeled according to Penninger and Keown (i.e. 50% canopy closure and 15" dbh criteria). Existing marten source habitat on the Wallowa-Whitman as modeled by Wales (2011) totals 129,943 acres. As a result of proposed activities under the 5 Points project, source habitats would be impacted at a maximum of 188 acres under Alternative 2. Because source and secondary habitats at the Forest level were modeled according to more conservative thresholds described by Wales (i.e. 60% canopy closure and 20" dbh criteria), it is reasonable to assume that the source habitat impacts would actually be less than the estimate based on the 50% canopy closure and 15" dbh criteria. Therefore, source habitat impacts at the Forest level would equate to less than 0.001% across alternatives.

Cluster analysis used to describe existing distribution of source habitats across the Wallowa-Whitman indicates that these habitats are well distributed across the Forest (Penninger and Keown 2011a). Post-treatment levels of source habitat under the 5 Points action alternative is expected to result in no change in the number of watersheds in Cluster W3 containing >40% source habitat that contribute to marten habitat distribution.

Landscape Permeability

Treatments proposed under each action alternative may decrease existing habitat permeability due to reduced canopy closure, decreased structural complexity, and increased disturbance on specified and temporary roads. However, large areas of connectivity exist between the Upper and Lower 5 Points subwatersheds because the proposed treatment area is restricted to the southern parts of these subwatersheds that are adjacent to privately-owned land. Commercial and non-commercial treatments in these areas will maintain the stand at the upper third of the site potential and higher levels of downed woody material.

Cumulative Effects for American Marten

Past, present, and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands have been incorporated into the existing conditions for amounts and locations of marten habitats in the analysis areas and into the viability analysis.

Appendix D of the EA was reviewed for actions that might affect marten habitat within the 5 Points watershed. Cumulative impacts of ongoing and foreseeable actions are projected out to 20 years from the present. Ongoing and future livestock grazing is expected to have no effect on marten habitat because cattle tend to avoid areas with high amounts of down wood. On Forest Service lands within and outside the project area, firewood cutting will continue to reduce available snags and logs, but the effect is limited to areas adjacent to open roads.

Conclusion

Because this project impacts less than 0.001% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative effect to marten habitat. The decrease in habitat quality due to the 5 Points Vegetation Management Project will be insignificant at the scale of the Wallowa-Whitman. The 5 Points watershed will remain below the threshold of 40% of the historical amount and this project will not change the watersheds contribution to species viability on the Wallowa-Whitman. No existing large trees (a vital component of marten source habitat) will be removed as part of this project. Marten connectivity between watersheds has been emphasized within this project and fuels treatments are intended to create resilient landscapes in the face of disturbances (insects, fire, disease) and environmental stressors (global climate change, human impact). Allowing natural processes to shape future structure stage in the long term, while being mindful of connectivity concerns over the short term will ensure marten can continue to thrive. This project **may impact individuals or habitat (MIIH)**, but will not affect overall population viability for marten.

II. Northern Goshawk

Background

Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the Northern goshawk (*Accipiter gentilis*) Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011b). Portions of that assessment are summarized below.

The Northern goshawk (*Accipiter gentilis*, hereafter goshawk) was chosen as a supporting indicator of abundance and distribution of mature and old-growth forests (LRMP 1990). The goshawk is associated with dense canopied mixed conifer, white fir, and lodgepole pine associations (Wisdom et al. 2000). Important habitat attributes of goshawk prey species include snags, down logs, woody debris, large trees, openings, herbaceous and shrubby understories, and an intermixture of various forest structural stages (Wisdom et al. 2000). Goshawks are prey generalists and use open understories below the forest canopy and along small forest opening to forage for mammals and small birds (Bull and Hohman 1994, Marshall 1992).

Goshawks use broad landscapes that incorporate multiple spatial scales to meet their life requisites (Squires and Kennedy 2006). At least three levels of habitat scale are recognized during the breeding season: (1) a nest area, composed of one or more forest stands or alternate nests; (2) a post fledging area (PFA), which is an area around the nest used by adults and young from the time of fledging, when the young are still dependent on the adults for food, to independence; (3) a foraging area that comprises the breeding pairs entire home range (Reynolds et al. 1992, Reynolds 1983).

The nest area, or nest site, is the area immediately surrounding the nest tree, including the forest stand containing the nest tree. In general, goshawk nest areas are unique in structure, associated with drainage bottoms, large trees, dense basal area, multiple canopies, and high canopy closure (>50%)

primarily within mature and older forests with high amounts of down wood and snags (McGrath et al. 2003).

The post fledging area (PFA) surrounds the nest area and is defined as the area used by the family group from the time the young fledge until they are no longer dependent on the adults for food, up to two months (Reynolds et al. 1992, Kennedy et al. 1994). PFAs generally have patches of dense trees, developed herbaceous and/or shrubby understories and habitat attributes (snags, down logs, small openings) that are critical for goshawk prey (Reynolds et al. 1992). The PFA is potentially important to the persistence of goshawk populations, as it may correspond to the area defended by the breeding pair and provides fledgling hiding cover and foraging opportunities as fledglings learn to hunt.

Foraging areas average 3,707-5,189 acres in size in eastern Oregon (Daw and DeStefano 2001). Goshawks can be considered habitat generalists at the large scale with a wide variety of prey species and associated habitat requirements (Squires and Kennedy 2006, Reynolds et al. 2007). Canopy cover >50%, dense basal area, and wet openings are critical near nest sites and decrease in importance as distance from nest site increases (Daw and DeStefano 2001). Common factors that influence prey distribution and abundance include snags, large downed logs, large trees, and canopy openings (Reynolds et al. 1992).

Viability Determination

Throughout the Interior Columbia Bain, the amount of source habitat (i.e., habitat requirements to provide long term population persistence) available to the goshawk has declined from historical conditions. The greatest declines have occurred in the interior ponderosa pine and western larch forest types. It is estimated that there has been a 96% decline in old forest single-story ponderosa pine (Wisdom et al. 2000). However, Douglas-fir, grand fir, white fir, lodgepole pine, and juniper sagebrush have all increased in abundance from historical conditions. The overall decline in source habitat and strong decline in the ponderosa pine cover type is offset somewhat by increases in these other cover types and structural stages that provide source habitat.

Additional source habitat analysis was conducted at a finer scale on National Forest lands as part of a species viability assessment conducted in support of the Blue Mountains Forest Plan revision (Penninger and Keown 2011b). The current viability outcome index for the Wallowa-Whitman show that current source habitat for the goshawk is slightly lower than for the entire Blue Mountains but is very near historical conditions, indicating that suitable habitats are broadly distributed and of high abundance, and the goshawk is likely well-distributed throughout the Wallowa-Whitman (Penninger and Keown 2011b).

LRMP Standards and guidelines

The Regional Forester's Eastside Forest Plan Amendment #2 (SCREENS) requires that all known and historically used goshawk nest-sites be protected from disturbance. An active nest is defined as a nest that has been used by goshawks within the past five years. SCREENS requires that a 30-acre buffer of the most suitable nesting habitat be established around every known active and historical nest tree(s), that it be deferred from harvest, and that a 400-acre post fledging area be established around every known active nest site. While harvest activities can occur within the PFA, up to 60% of the area should be retained in LOS conditions and harvest is to promote the development of LOS. Management of the PFA is intended to provide a diversity of forest conditions. Thinning from below with irregular spacing of leave trees would maintain the appropriate stand composition and structure. A seasonal restriction on logging in the PFA would be implemented during the nesting season from March 1 – September 30.

Existing Condition

5 Points Watershed

The 5 Points project area lies within the Upper and Lower 5 Points subwatersheds. These subwatersheds contains 6,539 existing acres of goshawk source habitat (habitat that can support a stable or increasing population of goshawk) out of 11,302.7 (57.9%) potential acres of goshawk habitat. The current watershed index is 2.55 with the historic watershed index at 2.94, indicating, indicating high historic and current levels of habitat quality and quantity. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically and is above the threshold necessary to support goshawk population viability (Penninger and Keowen 2011b). The weighted index of this watershed is 9332, indicating that this watershed provides habitat of the quality, quantity, and distribution to support a self-sustaining and well-distributed goshawk population.

5 Points Project Area

Northern goshawk source habitat was assessed for the 5 Points analysis area using four variables; potential vegetation group, canopy closure, number of canopy layers and tree size, as defined in the Northern Goshawk Management Indicator Species Assessment (Peninger and Keown 2011). Potential vegetation groups include dry ponderosa pine, dry Douglas-fir, dry grand fir, cool moist and cold dry. Canopy closure is generally greater than 40% in the dry vegetation types and greater than 60% in the cool and cold types. Canopy layers included both single and multi-story and tree size is defined as 15" dbh or greater. A GIS query found 6,539 acres of primary (source) northern goshawk habitat (27% of the analysis area).

Audio callback transects were conducted June 2020 along transects in identified goshawk source habitat and high intensity surveys were done around historic nest sites. Although goshawks were observed within the project area, no active goshawk nests were located area and more than 5 years have passed since goshawks have used historic nest sites located within the proposed treatment area. If any other nests are discovered during implementation, the same buffers and restrictions will apply according to guidelines.

Direct/Indirect Effects for Northern Goshawk

ALTERNATIVE 1

There will be no direct adverse effects to old-growth associated MIS from the No Action Alternative because no timber harvest, fuels treatments, or transportation activities will occur. Existing source habitat would remain unchanged. However, the no-action alternative maintains possible unsustainable conditions in late-seral stage montane forests where there have been large transitions from shade-intolerant to shade-tolerant tree species, described as a management issue for Group 6 habitats by Wisdom et al. (2000).

ALTERNATIVE 2

5 Points Project Area

Both commercial and non-commercial treatments would occur in northern goshawk source habitat under the action alternative. Intermediate harvest treatments are expected to increase average stand diameter due to removal of trees primarily in smaller size classes. Due to the possibility of snag removal during harvest and potential consumption of down logs during post-treatment prescribed fire, treatments that retain sufficient canopy closures are still expected to degrade, but not remove, source habitat. Although some habitat elements may be reduced where habitat is degraded, sustainability of habitats is expected to increase as stand density reductions lower the risk of disturbance such as stand-replacement fire, especially in Dry Forest types. Table 11 shows acres and percent of source habitat affected under the proposed alternative.

Treatments proposed under Alternative 2 would impact 873 acres. These harvest activities could alter 13.4% of goshawk source habitat within the 5 Points analysis area for approximately 20-30 years until canopy closure recovers and snags and logs are recruited. Although the treated acres may no longer meet the definition of source habitat, they would still be available for goshawk foraging, roosting, and travel between other habitat patches.

Table 11. Summary of Proposed Treatments in Goshawk Source Habitat in the 5 Points Project Area.

Treatment Type by Alternative, Acres, and Percent of Total Source Habitat		
	Alternative 2	
	Commercial	Non-Commercial
Acres of Goshawk Source Habitat	873 Acres	104 Acres
Percent of Total Source Habitat (6,539 Acres Total)	13.4%	1.6%

In addition to impacts to available habitats, each action alternative poses potential for direct impact to nesting individuals. Both timber harvest and prescribed fire could cause individual harm or mortality if operations destroy a nest tree occupied by young of the year. If goshawk nesting is discovered prior to, or during implementation, a no-activity nest area of at least 30 acres will be designated for active nests.

Goshawk Habitat at the Watershed Level

Watershed indices reported by Wales (2011) and further assessed by Penninger and Keown (2011b) for the existing condition showed that the 5 Points watershed currently contains a high amount of source habitat. Treatments proposed under Alternative 2 would reduce the amount of source habitat available in the watershed by approximately .03%. Post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the 5 Points watershed under all action alternatives, thereby continuing to contribute to species viability at the watershed scale.

Goshawk Habitat at the Wallowa-Whitman Scale

Existing goshawk source habitat on the Wallowa-Whitman as modeled by Wales et al. 2011 totals 440,696 acres. As a result of projected habitat loss under the 5 Points project, source habitats at the Forest-level would decline by less than .002% under the action alternative.

Cluster analysis used to describe existing distribution of source habitats across the Wallowa-Whitman indicates that these habitats are well distributed across the Forest. Post-treatment levels of source habitat under all 5 Points action alternatives result in no change in the number of watersheds in Cluster W3 containing >40% source habitat that contribute to goshawk habitat distribution.

Cumulative Effects for Northern Goshawk

Cumulative effects for goshawk are analyzed for the 5 Points watershed. Past, present and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands are incorporated into the existing conditions for amounts and locations of marten habitats in the analysis areas. Although some commercial treatments may occur within goshawk suitable habitat, the scale of potential impacts is not substantial in comparison to source habitats currently estimated to exceed 27,000 acres.

Appendix D of the EA was reviewed for actions that might affect goshawk habitat the 5 Points watershed. Ongoing and future livestock grazing is expected to have a minimal effect on suitable habitats. Additional grazing may occur in treated stands within the project area, but is not expected to alter suitable characteristics. On Forest Service lands within and outside the project area, firewood cutting will continue to reduce available snags and logs, but the effect is limited to areas adjacent to open roads. Access within the watershed and across the Wallowa-Whitman may change pending the outcome of the Forest Travel Management Plan. Timber harvest on private inholdings is expected to continue at some level, with anticipated reductions of trees larger than 10" dbh. Lands to the south of the project area will continue to consist of open grassland habitats in private ownership.

Wales et al. (2011) estimated that approximately 466,679 acres of source habitat existed on the Wallowa-Whitman historically. At the time of the analysis, approximately 440,696 acres (94% of estimated historical conditions) of source habitat occurred on the Wallowa-Whitman. Since the viability assessment was run 17 Vegetation/Fuels Restoration projects have been analyzed across the Wallowa-Whitman. Some have been implemented and some are still undergoing the NEPA process but are anticipated being implemented in the foreseeable future. These combined projects, including the 5 Points Vegetation Management project, anticipate commercially impacting 7,222 acres of goshawk source habitat and non-commercially impacting 19,151 acres of goshawk source habitat. Taking these 26,373 acres of impacted source habitat into account there is approximately 440,306 acres (94% of estimated historical conditions) of source habitat existing on the Wallowa-Whitman. Cumulatively, vegetation management activities on the Wallowa-Whitman are not expected to change the viability outcome found by Wales et al. and goshawk source habitat will remain well distributed and highly abundant (viability outcome A).

Conclusion

Because this project impacts less than .002% of goshawk source habitat across the Forest, the overall direct, indirect and cumulative effects will result in a minimal negative effect to goshawk habitat. The loss of habitat will be insignificant at the scale of the Wallowa-Whitman. Post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the 5 Points analysis area under all action alternatives, thereby continuing to contribute to habitat distribution and species viability on the Wallowa-Whitman. The proposed treatment **may impact individuals or habitat (MIIH)**, but will not affect goshawk population viability.

III. Pileated Woodpecker

Background

Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the Pileated woodpecker (*Drycopus pileatus*) Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011c). Portions of that assessment are summarized below.

Pileated woodpeckers feed primarily on ants (Beckwith and Bull 1985) in dead wood in snags, logs, and naturally created stumps (Bull et al. 1986). Based on research data compiled in the DecAID Wood Advisor (Mellen-Mclean et al. 2017) for eastside mixed conifer forests, 70% of pileated woodpeckers in the populations studied used snags > 12.9 " dbh for foraging. Stands with high density of snags and logs were preferred for foraging (Bull and Melsow 1977).

In northeast Oregon, the pileated woodpecker shows high selection for mature, unlogged grand fir stands with ≥60% canopy closure, multiple canopy layers, and high snag density (Bull 1987, Bull and Holthausen 1993). Bull et al. (2007) found that densities of nesting pairs of pileated woodpeckers were positively associated with the amount of late structural stage forest and negatively associated with the amount of area dominated by ponderosa pine and the amount of area with regeneration harvest. Although there is a preference for dense canopy stands, high tree mortality and loss of canopy closure in stands of grand fir and Douglas-fir did not appear to be detrimental to pileated woodpecker provided that large dead or live trees and logs were abundant and that stands were not subject to extensive harvest. Pileated woodpecker densities remained steady over 30 years in areas where canopy cover dropped below 60% due to tree mortality; older stands of grand fir and Douglas-fir consisting primarily of snags continued to function as nesting, roosting and foraging habitat for pileated woodpeckers. While closed canopy forests were not essential for use by pileated woodpeckers, nest success was higher in home ranges that had greater amounts of forested habitat with ≥60% canopy closure (Bull et al. 2007).

Viability Determination

Habitat trends of the pileated woodpecker were assessed at the Interior Columbia Basin, Blue Mountains ecological reporting unit (ERU), and Wallowa-Whitman scales using information provided by Wisdom et al. (2000) and the species viability assessment conducted by Wales (2011) in support of the Blue Mountains Forest Plan revision.

A fine-scale analysis of source habitat on National Forest lands in the Blue Mountains, including the Wallowa-Whitman was conducted in 2011 (Penninger and Keown 2011c).This analysis indicated that there has been a decline in the amount of source habitat on the Wallowa-Whitman from historical conditions. However, source habitat of the pileated woodpecker is still available in adequate amounts and distribution to maintain pileated species viability on the Wallowa-Whitman. Currently, there are approximately 206,374 acres (57% of historical condition) of source habitat on the Wallowa-Whitman, with twenty-nine of the thirty-five watersheds (83%) on the Wallowa-Whitman that historically provided source habitat, continuing to provide that habitat. Reductions of snags and the presence of roads has decreased the quality of source habitat in many watersheds but 33% of the watersheds on the Wallowa-

Whitman have high watershed index scores, indicating good habitat abundance, moderate to high snag densities and low to moderate road densities. 29% of the watersheds are in the moderate category. Watersheds having ≥ 40% of the median amount of source habitat are distributed across the Wallowa-Whitman and found in all clusters.

The viability assessment indicates the Wallowa-Whitman still provides for the viability of the pileated woodpecker. The pileated woodpecker is distributed across the Wallowa-Whitman and there are adequate amounts, quality, and distribution of habitat to provide for pileated woodpecker population viability.

Existing Condition

5 Points Watershed

The 5 Points project area lies within the Upper and Lower 5 Points subwatersheds. These subwatersheds contains 2,383.2 acres of existing pileated source habitat (habitat that can support a stable or increasing population of pileated woodpeckers) out of 14,643.4 (16.3%) acres of potential pileated woodpecker habitat. The current watershed index is 1.86 with the historic watershed index at 2.63, indicating a high historic level of habitat quality and a current moderate level of habitat quality and quantity. This watershed currently provides ≥ 40% of the median amount of source habitat that occurred historically and is above the threshold necessary to support pileated woodpecker population viability (Penninger and Keowen 2011c). The weighted watershed index is 2192.3, which indicates these subwatersheds provide habitat of the quality, quantity, and distribution to support a self-sustaining and well-distributed pileated woodpecker population.

5 Points Project Area

Wildlife surveys during summer 2020 identified at least one reproducing pair of pileated woodpeckers within the project area. Surveyors observed woodpeckers on four instances surveying between July 1 and September 30, 2020.

Although pileated woodpeckers will use many habitat types, successful reproduction is tied to source habitat, which is typically Old Forest Multi Structure (OFMS). Pileated woodpecker source habitat was assessed for the 5 Points analysis area using four variables; potential vegetation group, canopy closure, number of canopy layers and tree size, as defined by Penninger and Keown (2011c). Potential vegetation groups include dry Douglas fir, dry grand fir, cool moist and cold dry. Canopy closure is generally greater than 40% in the dry vegetation types and greater than 60% in the cool and cold types. Canopy layers included both single and multi-story and tree size is defined as 20 " dbh or greater. Source habitat for pileated woodpeckers within the 5 Points analysis area is approximately 2,383 acres, ~1% of the analysis area.

LRMP standards and guidelines

The LRMP requires that a 300-acre pileated feeding area be established in proximity to any patch of MA15 ≥ 300 acres and that at least 2 snags > 10" dbh per acre be maintained within the feeding area. The Regional Forester's Eastside Forest Plan Amendment #2 (SCREENS) requires the maintenance of snags and GTR trees >21" dbh at 100% potential population levels; at least 2.25 snags/acre are needed after post-sale activities are completed to meet the 100% level. The SCREENS require a higher density of snags compared to the LRMP and, therefore, designation of a 300-acre pileated feeding area as identified in the LRMP is exceeded by SCREENS directions. Within the 5 Points project area, there is one stand of trees designated MA15 that is >300 acres and it is bordered on the north end by >300 acres of roadless area.

In terms of snag management, a DecAID analysis (Mellen-Mclean et al. 2017) demonstrates that, although snag densities and size classes are different than historical distributions, the area currently provides ample amounts of small snags and near-historic densities of large snags (Figure 2).

Direct/Indirect Effects for Pileated Woodpeckers

ALTERNATIVE 1

There will be no direct adverse effects to pileated woodpeckers from alternative 1 because no timber harvest, fuels treatments, or transportation activities will occur. Existing source habitat for pileated woodpeckers would remain unchanged. The no-action alternative maintains potentially unsustainable conditions in warm, dry LOS forests where there have been large transitions from shade-intolerant to shade-tolerant species. In the near-term, these denser forests with greater structural complexity may be highly attractive to pileated woodpeckers. However, large uncharacteristic wildfires could render this habitat unsuitable.

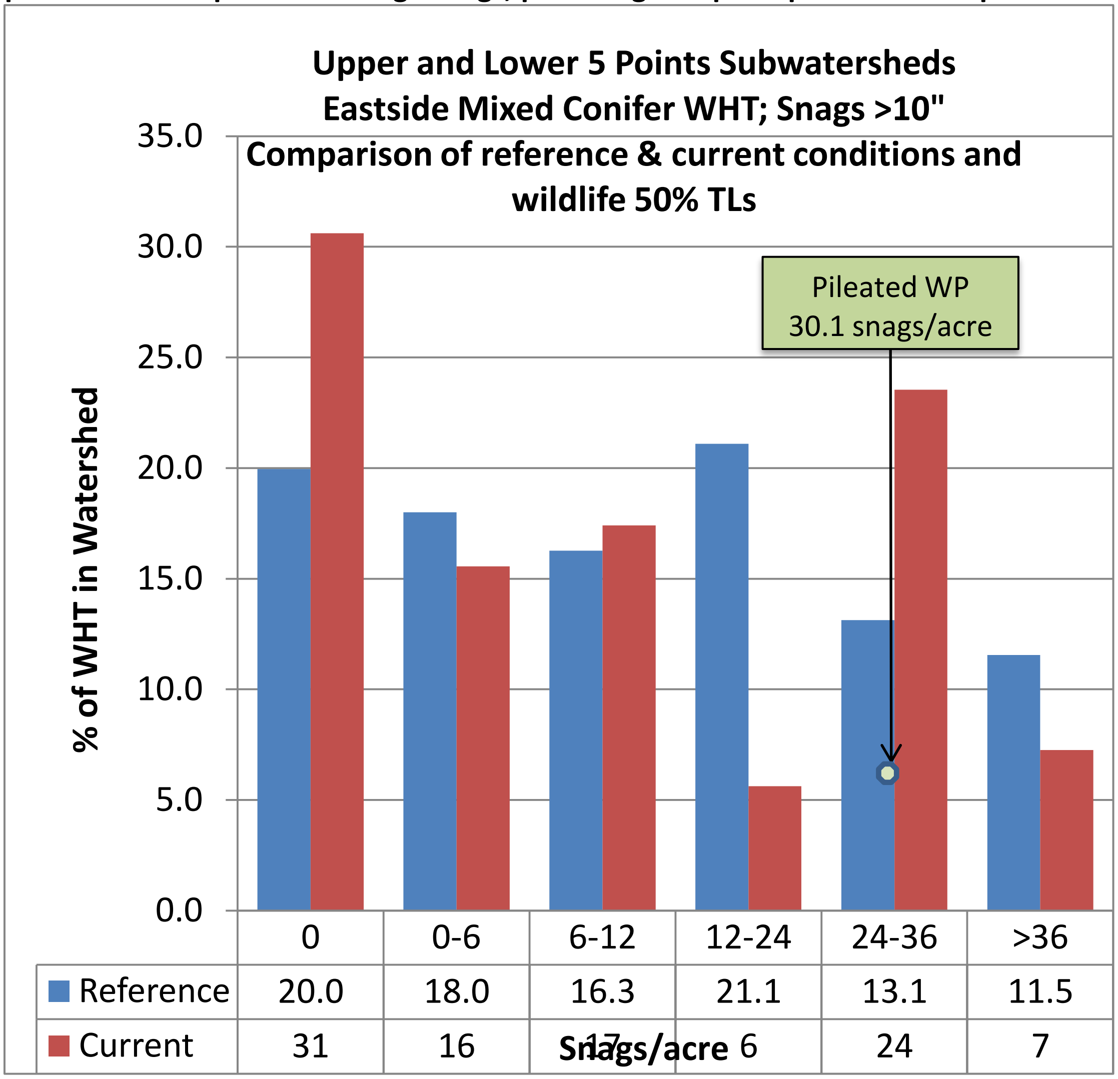
ALTERNATIVE 2

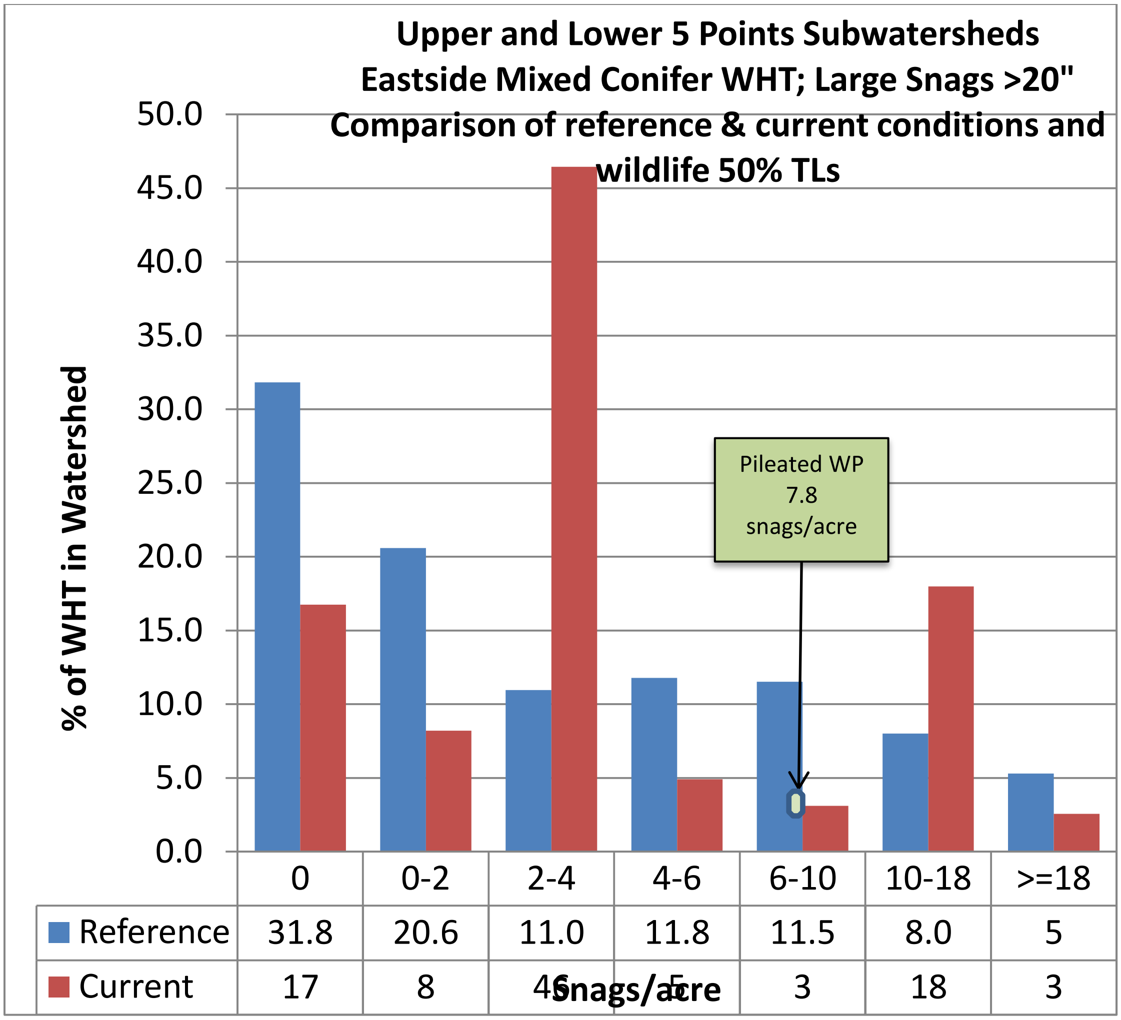
Both timber harvest and prescribed fire treatments within and outside timber harvest units would occur in pileated woodpecker source habitat under all action alternatives. Thinning harvest treatments are expected to increase average stand diameter due to removal of trees primarily in smaller size classes, but across all size classes for Alternative 2 . Treatments that retain canopy closures that meet the definition of source habitat would remain as source habitat. However, due to the possibility of minor snag reductions for logging safety, and potential consumption of downed logs and snags during post-treatment prescribed fire units, treatments that retain sufficient canopy closures are expected to degrade, but still function as source habitat. Although some habitat elements could be reduced, sustainability of habitats is expected to increase as stand density reductions lower the risk of disturbance such as stand-replacement fire, especially in warm, dry forest types. Table 12 shows acres and percent of source habitat proposed for treatment under each alternative.

Table 12. Pileated woodpecker source habitat is minimally affected by the action alternative in the 5 Points Project Area.

Treatment Type by Alternative, Acres, and Percent of Total Source Habitat		
	Alternative 2	
	Commercial	**Non-Commercial**
Acres of Pileated Woodpecker Source Habitat	6 acres	20 acres
Percent of Total Source Habitat (2,383 acres Total)	0.3%	0.8%

Figure 2. Approximately 30% of the landscape provides dense pockets of small snags and 23% provides dense pockets of large snags, providing adequate pileated woodpecker habitat.





Treatments proposed under Alternative 2 would affect the largest amount of pileated source habitat. Harvest activities may alter 11-18% of pileated source habitat within the 5 Points project area for approximately 20 years until canopy closure recovers and snags and logs begin to be recruited. Fuels activity could reduce structural complexity in the understory of pileated source habitat, but it will still meet the requirements for source habitat as long as down wood standards continue to be met.

Retention of all snags except for safety concerns minimizes the potential for direct impacts to nesting pileated woodpeckers. In the long-term, accelerated tree growth due to lower stocking densities is expected to develop large trees, and consequently large snags, at a faster rate than untreated areas. While long-term availability of total snag numbers may decrease, available snags will on average be larger in treatment units compared to untreated areas (See snag analysis).

Activities that increase overall human presence and project-related noise levels, including system road reconstruction as well as timber harvest, may temporarily displace pileated woodpeckers locally in the short-term (i.e. during implementation), but are not expected to impact distribution or productivity within the project area in the long-term.

Pileated Woodpecker Habitat at the Watershed Level

Watershed indices reported by Wales (2011) and further assessed by Penninger and Keown (2011c) for the existing condition showed that the 5 Points watershed low amount of source habitat compared to historical conditions. Treatments proposed under Alternative 2 would reduce the amount of source habitat available in the watershed by 1.1% (Table 10).

Post-treatment availability of source habitats would continue to exceed threshold of 40% of the historical amount in the 5 Points watershed under the action alternative, thereby continuing to contribute to species viability at the watershed scale.

Pileated Woodpecker Habitat at the Wallowa-Whitman Scale

Existing pileated woodpecker source habitat on the Wallowa-Whitman as modeled by Wales (2011) totals 129,943 acres. As a result of projected habitat loss under the 5 Points project, source habitats would be affected by a maximum of 26 acres. This results in a reduction in source habitat of <0.001% at the Forest level.

Cluster analysis used to describe existing distribution of source habitats across the Wallowa-Whitman indicates that these habitats are well distributed across the Forest (Penninger and Keown 2011c). Post-treatment levels of source habitat under both 5 Points action alternatives result in no change in the number of watersheds in Cluster W3 containing >40% source habitat that contribute to pileated woodpecker habitat distribution.

Cumulative Effects for Pileated Woodpeckers

Past, present and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman lands have been incorporated into the existing conditions for amounts and locations of source habitats in the analysis area.

Appendix D of the EA was reviewed for actions that might affect pileated habitat within the 5 Points analysis area. Cumulative impacts of ongoing and foreseeable actions within the next 5 years from the present which overlap in time and space with the 5 Points project and create a potentially measurable effect were considered. Ongoing and future livestock grazing is expected to have no effect on suitable habitats. Additional grazing may occur in treated stands within the project area, but is not expected to alter source habitats. On Forest Service lands within and outside the project area, firewood cutting will continue to reduce available snags and logs, but the effect is primarily limited to areas adjacent to open roads. Access within the watershed and across the Wallowa-Whitman will change when the Forest Travel Management Plan is implemented. Limiting public motor vehicle use to designated roads, trails and areas has the potential to reduce the miles of open roads where firewood gathering can reduce snags and logs. Timber harvest on private inholdings is expected to continue at some level, with anticipated reductions of trees larger than 10" dbh. Lands to the south of the project area will continue to consist of open grassland habitats in private ownership.

Wales et al. (2011) estimated that approximately 359,608 acres of source habitat existed on the Wallowa-Whitman historically. At the time of the analysis, approximately 206,374 acres (57% of estimated historical conditions) of source habitat occurred on the Wallowa-Whitman. Since the viability assessment was run 15 Vegetation/Fuels Restoration projects have been analyzed across the Wallowa-Whitman. Some have been implemented and some are still undergoing the NEPA process, but are anticipated being implemented in the foreseeable future. These combined projects, including the 5 Points Vegetation Management project, anticipate commercially impacting 6 acres of pileated source habitat and non-commercially impacting 20 acres of pileated source habitat. Taking these 26 acres of impacted source habitat into account, this results in extremely minimal effects forest-wide. Cumulatively, vegetation management activities on the Wallowa-Whitman are not expected to change the viability outcome found by Wales et al. and pileated source habitat will remain distributed frequently as patches and in low abundance (Viability outcome C).

Conclusion

Because this project impacts less than 0.001% of suitable habitat across the Forest, the overall direct, indirect and cumulative effects will result in a small negative effect to pileated habitat. The reduction of habitat would be immeasurable at the Wallowa-Whitman scale. Post-treatment availability of source habitats would continue to exceed the threshold of 40% of the historical amount in the 5 Points watershed under all action alternatives, thereby continuing to contribute to habitat distribution and species viability on the Wallowa-Whitman. This project **may impact individuals or habitat (MIIH),** but will not impact overall population viability.

Snag and Log Habitat: Primary Cavity Excavators

Background

More than 80 species of wildlife use snags and living trees with defects (deformed limbs or bole, decay, hollow, or trees with brooms) in the interior Columbia River basin (Bull et al. 1997). The Blue Mountains of Oregon have 39 bird and 23 mammal species that use snags for nesting or shelter (Thomas 1979). Habitat suitability for cavity-users is influenced by the size (diameter and height), abundance, density, distribution, species, and decay characteristics of the snags. The structural condition of surrounding vegetation determines foraging opportunities near snags (Rose et al. 2001).

Snag abundance is often considered the limiting factor for cavity nesting bird populations (Bull et al. 1997), though presence of snags alone does not reflect habitat quality. In general, populations of cavity nesting birds have declined across the Blue Mountains compared to historical conditions, primarily due to reductions in the numbers of large snags (Wisdom et al. 2000).

The Forest Plan identifies 15 primary cavity excavators (PCE) as management indicator species for the availability and quality of dead and defective wood habitat: Northern Flicker; Black-backed, Downy, Hairy, Lewis’s, American Three-toed, and White-headed Woodpeckers; Red-naped and Williamson’s Sapsuckers; Black-capped, Chestnut-backed, and Mountain Chickadees; and Pygmy, Red-breasted, and White-breasted Nuthatches (Table 13). A key assumption is that if habitat is provided for PCEs, then habitat requirements for secondary cavity users will be met. Surveyors visiting the project area from June 2020-September 2020 observed a White-breasted Nuthatch, a Northern Flicker, and a Red-naped Sapsucker nest with young within the project area boundary.

Table 13. Conservation status of cavity-nesting MIS

	Breeding Bird Surveys[1]		**Partners in Flight Database**[2]
Species	**Oregon**	**Reliability**	**BCR 10**

Black-backed Woodpecker	stable	yellow	**14**
Downy Woodpecker	stable	yellow	10
Hairy Woodpecker	stable	blue	10
Lewis's Woodpecker	no trend	red	**18**
Northern flicker	decrease	blue	**13**
American Three-toed Woodpecker	No data		**13**
Pygmy Nuthatch	stable	yellow	**14**
Red-breasted Nuthatch	stable	blue	11
Red-naped Sapsucker	stable	yellow	**17**
White-breasted nuthatch	stable	blue	8
White-headed Woodpecker	no trend	red	**18**
Williamson's Sapsucker	stable	blue	**17**
Black-backed chickadee	stable	blue	**13**
Chestnut-backed chickadee	stable	blue	11
Mountain Chickadee	decrease	blue	12

[1] Breeding Bird Survey - Increase = significant ($p<0.05$) increase from 1966-2009; Decrease = significant ($p<0.05$) decrease from 1966-2009; Stable = yellow or blue reliability and no significant increase or decrease; No trend = red reliability and no significant increase or decrease

[2] Partners in Flight - Regional Combined Scores can range from 5 to 25. Regional Combined Score > 13 may be a species of Regional Concern, highlighted in bold.

PCEs are a highly diverse guild, requiring a wide variety of habitat characteristics. On the Wallowa-Whitman, species that depend on Old Forest Single Story stands are of special concern due to drastic reduction of this habitat type. The Pygmy Nuthatch, White-breasted Nuthatch, and White-headed Woodpecker are associated with open late-seral ponderosa pine stands, large diameter trees and snags, and aspen meadows (Wisdom et al. 2000). Lewis's woodpecker also requires open pine habitat, but specializes in burned landscapes (Saab and Dudley 1998). Another fire specialist is the Black-Backed Woodpecker (Saab and Dudley 1998, Seavey 2012). However, this species occurs at a higher elevation in subalpine and montane forests, with young, dense, lodgepole pine stands providing excellent habitat (Hutto 1995, Wisdom et al. 2000).

Another cluster of PCEs select for aspen meadows, threatened by conifer encroachment across the west. Northern flickers glean ants from the ground and rely on meadow edges for foraging (Wiebe and Gow 2013). Nest sites are associated with mature aspen; open stands composed of few conifers, larger diameter snags with few low branches, more fallen dead trees, and few close neighboring trees (Lawler and Edwards 2006). Red-naped Sapsuckers, Williamson's Sapsucker, Hairy Woodpecker, Downy Woodpecker, Red-breasted Nuthatch, and Pygmy Nuthatch all select for aspen as nest trees when available, with the nuthatches slightly more likely to nest in conifers (Li and Martin 1991). Chestnut-backed chickadees are also associated with mature aspen stands and use small snags for foraging (Wisdom et al. 2000).

Yet another group within the PCE guild depend on higher density stands. The Red-breasted Nuthatch is bark-foraging species, associated with higher basal area and dense pockets of snags 10-20" dbh (Bevis and Martin 2002) with higher structural diversity (Adams and Morrison 1993). Similarly, mountain and black-backed chickadees are frequently found in dense shelterwood (Bevis and Martin 2002). The three-toed woodpecker is associated with large spruce and boreal forests, specializing in spruce beetle infested stands (Kelly et al. 2019) and uncommon on the Wallowa-Whitman NF. Managing for all PCEs is a challenging task, requiring snag retention and recruitment in all forest types.

LRMP standards

LRMP direction is to maintain snags and green tree replacement trees of ≥21" dbh, or whatever is the representative diameter of the overstory layer if <21" dbh (U.S. Forest Service 1995). The LRMP used information from Wildlife Habitats in Managed Forests (Thomas et al. 1979; at least 2.25 snags >20" dbh per acre) to establish minimum snag guidelines. The model Thomas (et al. 1979) used to generate snag densities addressed snags for roosting and nesting, but did not consider snags for foraging, and was never scientifically validated. More recently, several studies have shown these snag densities are too low to meet the needs of many primary and secondary cavity users (Bull et al. 1997, Harrod et al. 1998, Korol et al. 2002). Consequently, the original standards for snags and down wood from Thomas et al. (1979) were replaced with the Regional Forester's Forest Plan Amendment #2 (U.S. Forest Service 1995). Bull et al. (1997) found the 2.25 snags/acre insufficient and that 4 snags/acre (2.8 between 10-20" dbh and 1.2 >20" dbh) is more appropriate as a minimum density required by primary and secondary cavity users for roosting, nesting, and foraging needs.

Rose (et al. 2001) reports that the biological potential models employed by LRMP standard are a flawed technique and no longer the best available science. The DecAID Advisor is employed in the next section to accommodate this. Until the LRMP is amended to reflect current science, 100% biological potential is the minimum number of snags that need to be maintained through the life of the stand rotation.

Direction from the Eastside Screens requires that pre-activity levels of logs be left unless those levels exceed those shown in Table 14. Live green trees of adequate size must also be retained to provide replacements for snags and logs through time. Generally, green tree replacements (GTRs) need to be retained at a rate of 25 to 45 trees per acre, depending on biophysical group. Pre-activity levels of logs should also be left unless levels exceed amounts specified in Amendment #2 (U.S. Forest Service 1995). Larger blowdowns with intact tops and root wads are preferred to shorter sections of tree boles.

Table 14 - LRMP standards for down wood[1] (U.S. Forest Service 1995).

Stand type	Pieces/acre[1]	Piece length	Diameter small end	Linear ft/acre
Ponderosa Pine	3-6	> 6`	12``	40`
Mixed conifer	15-20	> 6`	12``	140`
Lodgepole Pine	15-20	> 8`	8``	260`

[1] The table converts to about 0.4, 1.7, and 3.3 tons/acre for ponderosa pine, mixed conifer, and lodgepole pine,

The Decayed Wood Advisor (DecAID)

Integration of the latest science is incorporated into this analysis using DecAID Advisor (version 3.0) (Mellen-McLean et al. 2017) which is an internet-based summary, synthesis, and integration of the best available science. The analysis area for the DecAID distribution analysis is larger than the project area and encompasses the Upper and Lower 5 Points subwatersheds. The larger analysis area was needed to meet the minimum analysis area size of 12,800 acres per wildlife habitat type recommended by the authors of DecAID (Mellen-McLean et al. 2017).

We compared distribution analysis results to the needs of PCEs using tolerance levels and intervals from the DecAID database for each wildlife habitat type (WHT) important to PCEs that occur in this study area. A tolerance interval is similar to a confidence interval but with a key difference: tolerance intervals are estimates of the percent of all *individuals* in the population that are within some specified range of values. In comparison, confidence intervals are estimates of *sample means* from the population of interest.

For example, if the 50% tolerance level for snag density at pileated woodpecker nest sites in a specific wildlife habitat type is 7.8 snags/acre, 50% of nest sites used by pileated woodpeckers in that habitat have <7.8 snags/acre and 50% of nest sites used by pileated woodpeckers have >7.8 snags/acre.

Existing Condition of Dead and Defective Habitat

Ponderosa Pine/Douglas-fir Wildlife Habitat Type

Overall, the Ponderosa Pine/Douglas-fir (PPDF) WHT within the Upper and Lower 5 Points subwatersheds has an abundance of small snags and a similar amount of large snags compared to historical estimates (Figures 3, 4). Although the distribution of large snags in the current landscape is different than past, the overall percentage of the landscape containing 2-4 snags per acre and 10-18 snags per acre is much larger. Historically, 43% of the landscape within the study area had 0 small snags per acre and 59% of the landscape had 0 large snags per acre, probably due to a high frequency, low severity fire regime that killed saplings and consumed smaller snags upon reburn. Fire suppression, among other factors, has drastically altered the landscape.

In terms of small snags, White-headed Woodpecker, Black-Backed Woodpecker, and the small cavity nesters are all provided with over 50% tolerance level (TL) of snags required (Table 15). The subwatersheds only meet the 50% TL required number of small snags for Pileated and Williamson's woodpeckers in 6% of the land area. However, looking at large snags, TLs are exceeded for all species. There is an adequate number of snags within this subwatershed according to the current standards. However, stands in the Southern Blue Mountains are 273-316% more dense and contain 60-176% higher basal area currently than in the late 1800s (Johnston et al. 2018), affecting all of the PCEs that depend on open stands for maneuverability and nesting habitat. Conifer encroachment is a major factor in the decline of aspen meadows in the west, which in turn affects the species of snags that are recruited for PCE use.

Table 15 - Tolerance levels for woodpeckers occurring in the PPDF Wildlife Habitat Type from DecAID.

Species	Snag density/acre for 50% tolerance levels	
	>10” dbh	>20” dbh
White headed woodpecker	3.9	1.8
Cavity-nesters	4.7	N/A
Black-backed Woodpecker	13.6	1.4
Williamson's sapsucker	28.4	8.4
Pileated woodpecker	30.1	7.8

Figure 3. Historical and current PPDF small snag abundances within the study area.

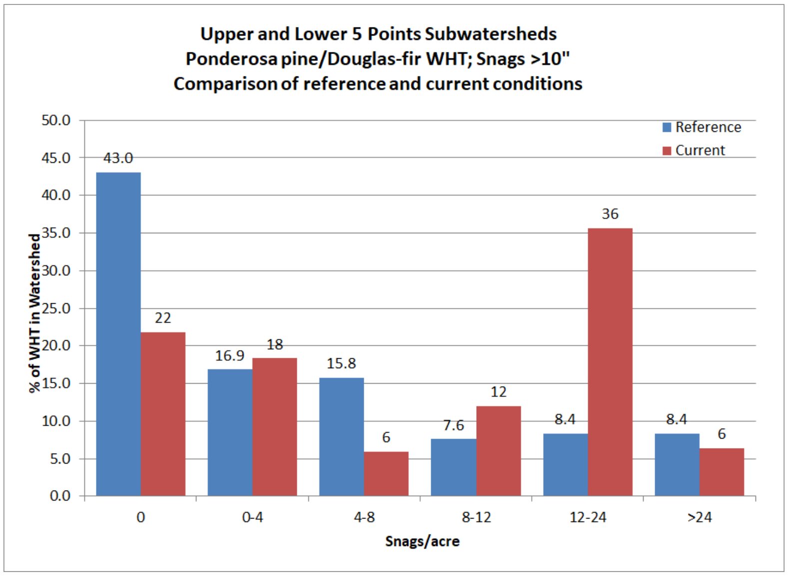
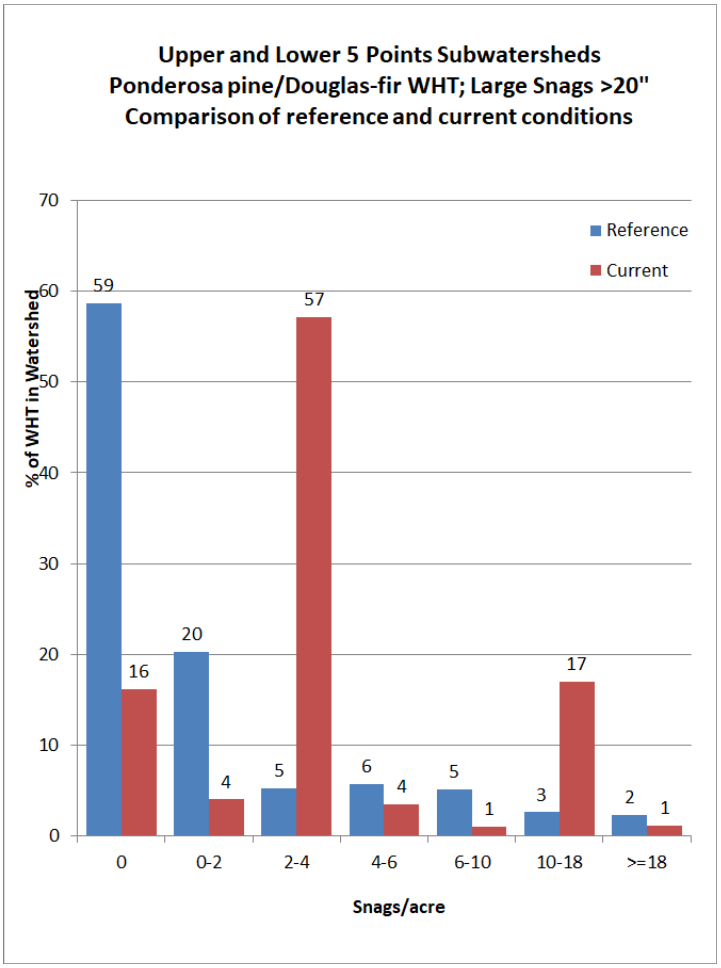


Figure 4. Historical and current PPDF large snag abundances within the study area.



Eastside Mixed Conifer Wildlife Habitat Type

The 50% TL for small and large snags (Table 16) is met or exceeded for all species of concern within the study area for the Eastside Mixed Conifer (EMC) WHT. There is a similar abundance of small snags and a similar amount of large snags compared to historical estimates (Figures 5, 6). Like the PPDF WHT, 2-4 large snags per acre is overrepresented in the landscape compared to historical amounts. This is probably due to long-term fire suppression. Historically, mixed-severity fire within the EMC WHT would kill small trees, recruit new large snags, as well as consume older snags in the landscape.

Table 16 - Tolerance levels for woodpeckers occurring in the EMC Wildlife Habitat Type from DecAID.

Species	Snag density/acre for 50% tolerance levels	
	>10" dbh	>20" dbh
White headed woodpecker	1.9	1.5
Cavity-nesters	N/A	2.4
Black-backed Woodpecker	13.6	1.4
Williamson's sapsucker	28.4	8.6
Pileated woodpecker	30.1	7.8

Figure 5. Historical and current EMC small snag abundances within the study area.

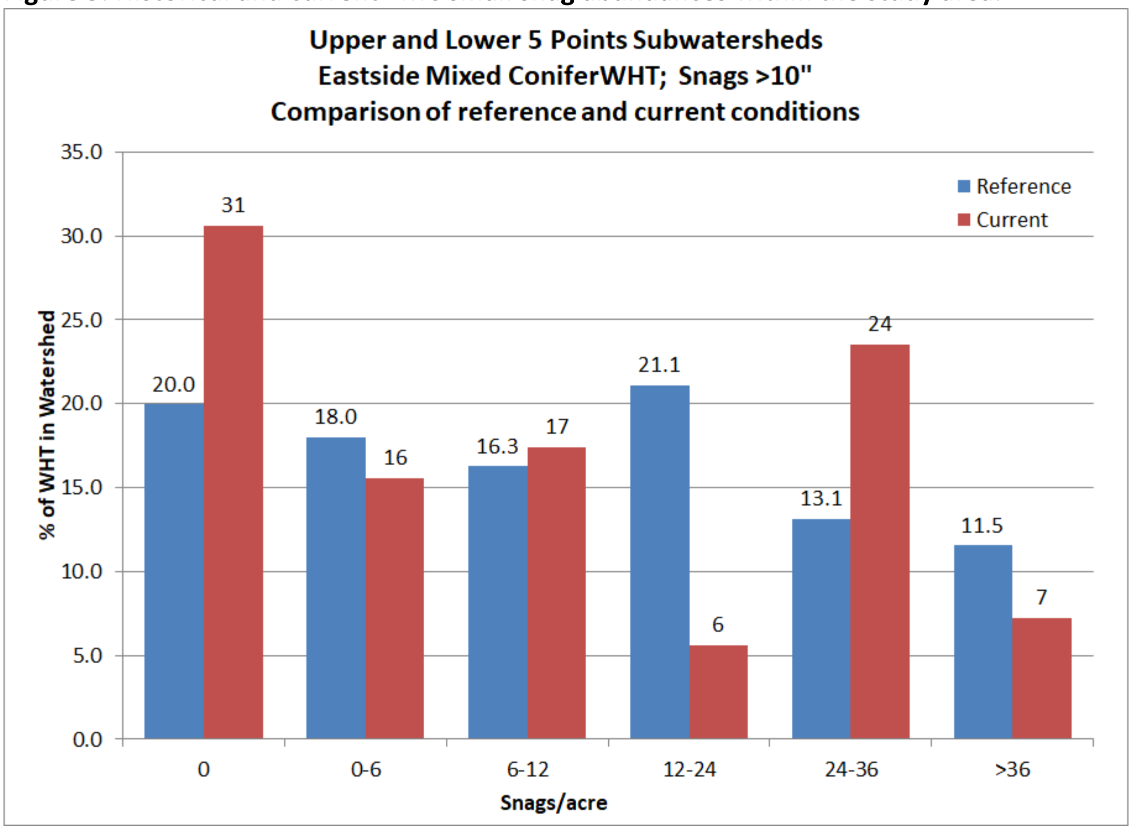
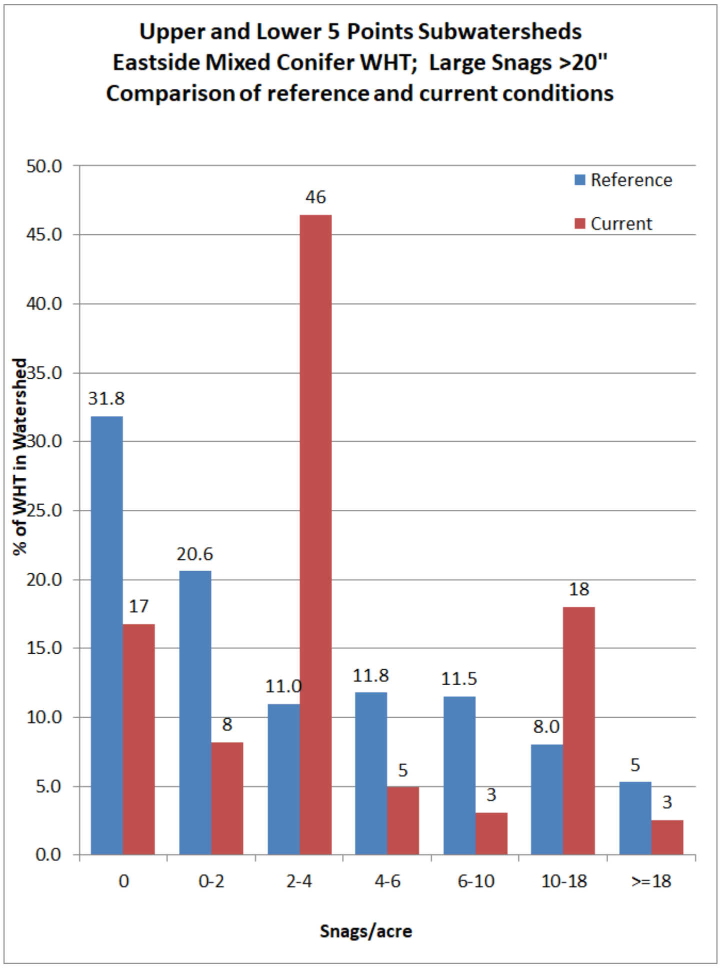


Figure 6. Historical and current EMC large snag abundances within the study area.



Direct/Indirect Effects – Snag and Log Habitat

ALTERNATIVE 1

This alternative retains the most snag habitat in the short-term and mid-term to the degree that snags would not be taken during treatment or consumed during prescribed burns. Snag numbers would remain adequate, but habitat effectiveness would reduce over time for species that require open stands or aspen meadows, which is the majority of the PCE guild. The probability of stand-replacing fires would increase, potentially benefitting Lewis' and Black-Backed Woodpeckers.

ALTERNATIVE 2

Non-commercial

Project activities will not remove any snags >12 inches except when they pose a safety hazard. Non-commercial fuels treatments are not expected to negatively affect snag densities; though in the long-term pre-commercial thinning is expected to provide larger snags, similar to commercial thinning. Snags that are lost in prescribed burns are often replaced with new snags from trees killed during the burn. Proposed fuels activities (removing small trees, retaining large trees, prescribed burning) are expected to help create habitat for PCEs specializing in open forests with large trees (the majority of the PCEs) and reduce habitat for those PCEs using dense forests (Red-breasted Nuthatch, chickadees, and three-toed woodpecker).

About half of the units slated for prescribed fire will receive treatment, and results are normally quite patchy within the burn blocks. Prescribed burning creates a period of reduced "soft snag" habitat that persists into the early mid-term. This can cause wildlife species that depend on such structures, such as pileated woodpeckers, to move to other areas in search of suitable habitat, resulting in lower productivity and reduced local populations. Although burning would likely reduce the densities of snags and logs, the burn plan is designed to protect large snags through unit preparation and ignition techniques. The function of snag and log habitat in the analysis area is not likely to be compromised by prescribed fire given the considerations that are built into the prescription. Prescribed fire can create new snags and logs to replace some of the small to medium diameter material that may burn. However, newly created snags and logs are usually hard and not easily excavated until well-aged.

Commercial

Commercial thinning and improvement thinning are proposed for the 5 Points project area and are expected to affect future recruitment of snags. Models were run using the Forest Vegetation Simulator (FVS) looking at different treatments on different stands in the dry, moist, and cold forest types to see the effects to snags comparing no treatment and treatment after 30 and 50 years.

All commercial treatments will reduce the density of snags on the landscape in the short and the long-term. Treatments are designed to improve the health of the stand, reducing competition, insect and disease mortality which in turn reduces snag recruitment. After 30 years, a treated area has a range of 9-28 snags/acre as opposed to 16-76 snags/acre in an untreated area, and after 50 years a range of 7-35 snags/acre is found in treated areas compared to 20-70 snags/acre in untreated areas. These ranges in the treated areas still meet the minimum thresholds for primary cavity excavators and still meet forest plan standards for ecologically appropriate numbers. With treatment, snag size tends to be larger than without treatment. The average dbh of snags in treatment areas after 30 years is 11.2" as opposed to 8.8" dbh. Fifty years after treatment, the average dbh in treated stands is 12" dbh compared to 10" dbh in untreated stands. Treatments increase the growth rate of the remaining trees, thus increasing the amount of large trees in the mid to long-term.

The action alternative proposes commercial treatment, non-commercial treatment, and prescribed fire (Table 17). Commercial treatment has the highest short-term negative effect on the overall density of snags in the project area, but long-term would provide the greatest positive effect on large snag recruitment. The action alternative would maintain snag levels above forest plan standards and provide habitat for PCE's of at least at the 50% TL.

Table 17 - Comparison of proposed commercial and non-commercial treatments between Alternatives. Percentage is percent of project area

Treatments	Measure	Alternative 1	Alternative 2
Commercial	Acres % Project Area	0	578 17%

Non-commercial	Acres % Project Area	0	923 21%
Total Commercial/ Non-Commercial	Acres % Project Area	0	1,501 44%
Prescribed Fire	Acres % Project Area	0	1,480 43%

Cumulative Effects on Snag and Log Habitat

The list of past, present and foreseeable actions was reviewed to determine potential effects to dead and defective wood habitat. Effects of past activities including road construction, fire suppression, prescribed fire, and timber management on Wallowa-Whitman and BLM lands have been incorporated into the existing condition. Firewood cutting will continue to reduce available snags and logs, but the effect is limited to areas adjacent to open roads. Roads that are temporarily open for harvest activities will temporarily increase firewood cutting activities and snag densities in those areas will go down, though it is illegal to take snags > 21" dbh. Precommercial thinning activities on adjacent private lands would not directly affect current snag levels but are expected to reduce future snag densities and increase average snag diameter while still maintaining Forest Plan snag standards. Timber harvest on private inholdings is expected to continue at some level, with anticipated reductions of trees larger than 10" dbh and snag densities are expected to decline.

Conclusion

Current availability of snags in the project area indicate deficiencies in large snag densities within the Ponderosa Pine/Douglas-fir and Eastside Mixed Conifer Habitat Types, though habitat remains for all species at the 50% tolerance level. All proposed activities are consistent with Forest Plan and BLM Resource Management Plan standards and guidelines pertaining to PCEs. Timber harvest and prescribed burning under the action alternatives has the potential to decrease snag densities, but that impact is expected to be minor within the project area and the landscape as a whole.

Harvest treatments will result in lower levels of green tree recruitment, but recruitment levels meet Forest Plan standards and exceed recommendations (Bull et al. 1997, Harrod 1998). Stand density treatments in conifer stands are expected to enhance habitats for Northern Flicker, Pygmy Nuthatch, White-breasted Nuthatch, and Williamson's Sapsucker green tree habitats. Although treatments would improve habitats for these species within the project area, the effect to habitats Forest-wide would be minor considering that the project area encompasses only <1% of the Wallowa-Whitman acres. Proposed tree density reduction treatments would reduce risk to insect and wildfire disturbance on up to 3,430 acres within the project area, thereby reducing the potential for future pulses of habitat suitable for Lewis', hairy, and black backed woodpeckers. No alternative considered for the 5 Points project would affect population trends or viability for PCEs at the Forest level. The action alternative **may impact individuals or habitat (MIIH)**, but will not affect population viability of any PCE species.

Neotropical Migratory Bird Species

Background

A migratory bird is defined by the Migratory Bird Treaty Act of 1918 as any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual migration patterns. They are a large group of species, including many hawks (*Buteo sp.*), shorebirds (*Charadriiformes*), flycatchers (*Muscicapidae sp*), vireos (*Vireonidae sp.*), swallows (*Hirundinidae sp.*), thrushes (*Turdidae sp.*), warblers (*Parulidae sp.*), and hummingbirds (*Trochilidae sp.*), with diverse habitat needs spanning nearly all successional stages of most plant community types. Nationwide declines in population trends for migratory species, especially neotropical species, have developed into an international concern. Recent analyses of local and regional bird population counts, radar migration data, and capture data from banding stations show that forest-dwelling bird species have experienced population declines in many areas of North America (Finch 1991). Habitat loss is the primary reason for declines. Other contributing factors include fragmentation of breeding grounds, deforestation of wintering habitat, and pesticide poisoning.

The U.S. Fish and Wildlife Service (FWS) is the lead federal agency for managing and conserving migratory birds in the United States; however, under Executive Order (EO) 13186 all other federal agencies are charged with the conservation and protection of migratory birds. This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. The order required federal agencies to develop Memorandum of Understandings (MOU) with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporate migratory bird conservation into agency planning processes whenever possible.

In response to this, the Forest Service has implemented management guidelines that require the Forest Service to address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans (Executive Order 13186, 2001). To aid in this effort, the USFWS published *Birds of Conservation Concern 2008* (BCC 2008). The overall goal of the report is to identify the migratory (and non-migratory) bird species that represent the high conservation priorities. BCC 2008 uses current conservation assessment scores from three bird conservation plans: Partners in Flight North American Landbird Conservation Plan (PIF), the United States Shorebird Conservation Plan (USSCP), and the North American Waterbird Conservation Plan (NAWCP).

Bird Conservation Regions (BCRs) are used to separate ecologically distinct regions in North American with similar bird communities, habitats, and resource management issues. Species contained within the BCC are identified for each BCR. The La Grande District and majority of the Wallowa-Whitman National Forest (Wallowa-Whitman) is found within BCR-10, Northern Rockies.

Existing Condition

BCR-10 includes the Northern Rocky Mountains and outlying ranges in both the United States and Canada, and the inter-montane Wyoming Basin and Fraser Basin. The Rockies are dominated by a variety of coniferous forest habitats. Drier areas are dominated by ponderosa pine, with Douglas-fir and lodgepole pine at higher elevations and Engelmann spruce and subalpine fir even higher. More mesic forests to the north and west are dominated by eastern larch, grand fir, western red cedar and western hemlock. In 2000, the Oregon-Washington Chapter of Partners in Flight published its Northern Rocky Mountains Bird Conservation Plan (Altman 2000). The plan provides conservation recommendations for the various species of landbirds that occupy the Oregon and Washington portions of the Interior Columbia Basin. Dry Upland forest and Moist Upland forest are represented within the 5 Points project area. Formal surveys have not been conducted specifically for any of these species within the 5 Points analysis area, although terrestrial birds were monitored in the Blue Mountains from 1994-2011 as part of the U.S. Forest Service Avian Monitoring Program, as well as multiple annual breeding bird survey route through the La Grande and Baker districts (Sauer et al. 2011). See Table 18 for NTMB species present within the project area.

Table 18 - Migratory species of conservation concern identified within the 5 Points analysis area.

Focal Species	Key Habitat Relationships	
	Vegetation Species	**Habitat Structure**
Dry Forest		
Flammulated Owl	Ponderosa pine, Douglas-fir	Old forest with grassy opening and dense thickets
Chipping Sparrow	Ponderosa pine	Short-statured herbaceous understory with scattered sapling pines
White-headed Woodpecker	Ponderosa pine	Large patches of late-successional forest with heterogeneous canopy cover
Moist Mixed Conifer Forest		
Townsend's Warbler	Grand fir, Douglas-fir	High canopy cover and foliage volume
Olive-sided Flycatcher	Grand fir	Open conifer forests (<40% canopy cover), edge and openings with scattered trees
Orange-crowned Warbler	Riparian vegetation, fir	Patches of a dense understory shrub layer, low canopy lift, and younger, more open stands
Williamson's Sapsucker	Grand fir, spruce, lodgepole pine	Large snags, coniferous trees, dead and downed wood
MacGillivray's Warbler	Grand fir, riparian vegatation	Patches of a dense understory shrub layer

Direct/Indirect Effects

To enhance readability of the direct and indirect impact on the migratory bird species of concern within the 5 Points project area, specific effects for each species is detailed for each alternative in Table 19. Alternative 2 proposes converting 726 acres acres of old forest multi-story (OFMS) and understory reinitiation (UR) to the historically abundant (now scarce) old forest single-story (OFSS), benefitting species that depend on dry forest (Table 18). The action alternative has the potential to increase nest parasitism by cow birds by opening up forest stands and increasing available forage for livestock. Treatments within moist upland forest are largely non-commercial, promoting the health of drought- and fire-tolerant species. The proposed treatments will reduce OFMS cover from 20% of the watershed to 19% of the watershed, keeping values well-within HRV and leaving trees >21" dbh. While stand complexity will be reduced, canopy cover will be retained and will still provide habitat for species depending on moist mixed conifer habitat type.

Table 19 - Impacts to habitat of migratory species of conservation concern within the 5 Points analysis area.

Species	Impacts to Habitat	
	Alternative 1 - No Action	**Alternative 2**
Flammulated Owl	Potential source habitat would continue to be unsuitable due to high densities of small diameter trees.	Commercial treatment within 81 acres of OFMS is expected to convert stands to OFSS. Commercial treatment within 77 acres of understory reinitiation (UR) is expected to become OFSS habitat in the long-term. Non-commercial treatment is proposed within 36 acres of OFMS and 532 acres of UR.

Species	Impacts to Habitat	
	Alternative 1 - No Action	Alternative 2
Chipping Sparrow	Potential source habitat would continue to be unsuitable due to high densities of fir spp., out-competing shade-intolerant pine saplings.	See above for treatment acres benefitting species in the dry forest community. Although ponderosa pine saplings would be negatively impacted in the short-term, creating a more open canopy will allow this shade-intolerant species increased seed germination and recruitment into the sapling stage.
White-headed Woodpecker	Potential source habitat would continue to be unsuitable due to high densities of fir spp., out-competing shade-intolerant pine saplings.	See above for treatment acres benefitting species in the dry forest community. Large snags in the softwood stage are essential to nesting and will not be affected by this alternative unless individual trees pose a safety concern. Mature ponderosa that produce prolific pinecones provide important winter forage and will benefit from this proposed alternative by elimination of encroaching tree species that compete for resources with ponderosa.
Townsend's Warbler	High density stands will continue to provide nesting and foraging habitat.	Commercial treatment proposed on 117 acres within OFMS will reduce existing >70% canopy cover, though all >21" dbh trees will remain. Habitat is expected to be unsuitable for Townsend's warbler until stand develops high canopy closure again. However, there are extensive tracts of well-connected OFMS habitat adjacent to the project area.
Olive-sided Flycatcher	Suitable habitat condition would continue to be absent until suppression mortality created gaps and edge habitat.	Variable density thinning would create more diverse stand conditions and accelerates growth of larger trees that may become snags. Forest gaps would increase understory growth, contributing to increased insect production over the next 20 years. Increased forest edge habitat would also enhance foraging opportunities. Gaps created by thinning may allow foraging until the canopy eventually closes again and these opportunities are lost.
Orange-crowned Warbler	Existing conditions would continue to provide habitat for this species due to an excess of UR compared to HRV.	The proposed action alternative would reduce shrub cover in the short term, but would reduce competition for sunlight and nutrients in mature stands in the medium to long term.
Williamson's Sapsucker	Existing conditions would continue to provide suitable habitat for the Williamson's Sapsucker at the HRV, but important aspen habitat would continue to be encroached upon by conifer species.	The proposed action alternative would reduce dead and down materials, but will maintain a minimum of 7-15 tons/ac per project design criteria. Slash and debris from harvest operations may provide habitat for important prey species (carpenter ants) for the Williamson's Sapsucker. Large snags will be protected under this proposed alternative.
MacGillivray's Warbler	Existing conditions would continue to provide habitat for this species due to an excess of UR compared to HRV.	The proposed action alternative would reduce shrub cover in the short term, but would reduce competition for sunlight and nutrients in mature stands in the medium to long term.

Cumulative Effects

Effects of past activities including road construction, fire suppression, prescribed fire, grazing, and timber management on Wallowa-Whitman lands have been incorporated into the existing condition. Livestock grazing is expected to continue within the analysis area. Habitat improvements afforded by the action alternatives may also increase access of areas to livestock and brown-headed cowbirds. The potential for increase in nest parasitism is expected to be most pronounced in areas adjacent to existing cattle operations and agriculture on private lands along the southern boundary of the project area.

Timber harvest on adjacent private lands is expected to continue, limiting availability of late and old forest structure and large snags. Therefore, habitat on National Forest lands will be increasingly important as habitat on private lands is potentially reduced.

Conclusion

The action alternative has the potential to directly impact neotropical migratory bird species, due to potential nest tree removal during the nesting season. The no-action alternative removes direct impacts to this guild, but maintains habitat conditions that favor high-density forest stands that may not be suitable habitat or sustainable in the long-term. Implementing project work outside of nesting season limits the potential for direct impacts to nesting land birds.

The action alternative improves dry forest habitats by restoring old forest single-story structure, thereby benefiting land birds associated with this habitat type. It would decrease available moist old forest multi-story with >70% canopy cover. The proposed action alternative will not affect population viability for any migratory bird species due to the limited size of the project area compared to available habitat.

Connectivity of Old Forest (LOS) Habitat

Background

The SCREENS provides direction for connectivity. Old growth stands are directed to be connected in a least two different directions by the shortest length, minimum 400 ft. wide corridor which maintains canopy cover in the upper one-third of the site potential. If this standard cannot be met, proposed treatments are dropped.

Old-growth habitat is categorized and analyzed in 2 categories according to the LRMP: 1) late/old structure (LOS) habitat; and 2) MA15 – Old-growth Preservation. Habitat covered by either category is intended to provide for old-growth associated wildlife species; however, the two terms have different administrative implications. LOS is a general term referring to old forest multi-story (OFMS) and/or old forest single-story (OFSS). Maintaining connectivity and reducing fragmentation of LOS stands is important for the movements of old growth associated species. MA15 land is specifically designated for Old-Growth Preservation. These old-growth areas are intended to maintain habitat diversity, preserve aesthetic values, and to provide old-growth habitat for wildlife.

Connectivity between MA-15 "old growth" and Old Forest (LOS) stands was assessed using field reconnaissance, aerial photographs and GIS mapping. The connectivity network connects, to the extent possible, all Old Forest and MA-15 stands within and outside the project area according to direction in the Eastside Screens. This approach of addressing connectivity habitat is consistent with direction in the Eastside Screens to retain canopy closure in the upper 1/3 of site potential, and other criteria that define connective corridors.

Range of Variation

Regional Forester Amendment #2 of June 12, 1995 established interim riparian, ecosystem, and wildlife standards for timber sales (these standards are referred to as the "Eastside Screens"). The Eastside Screens require that a range of variation approach be used when comparing historical reference and current conditions, incorporating the best available science. The range of variation approach assumes that native species have evolved with the historical disturbance regimes of an area and so a forest would continue to sustain populations of those species if current conditions fall within the historic range of variation (Powell 2010).

Single-story old forest is extremely deficient within the project area and species such as the flammulated owl, common flicker, and white-headed woodpecker that are adapted to an open forest structure are currently experiencing population declines. Both action alternatives would maintain existing old forest and bring the project area closer to HRV by treating understory reinitiation and old forest multi-story to return to old forest single-story conditions. This would increase the likelihood that species associated single-story old forest would continue to persist.

Existing Condition

Distribution of old forest multi-story stands, old forest single-story stands, and were used to identify watershed level landscape scale connectivity. The eastern portion of the analysis area is well-represented by complex, dense old forest multi-story stands occurring on northeast-facing slopes. Within the areas where treatments are proposed, connectivity is present, but not as extensive due to historical forest management and naturally occurring meadows.

Although connectivity is adequate within the analysis area, the distribution of old forest structures favor old forest multi-story and the species that thrive in dense, complex stands. Within Moist Upland Forests in the 5 Points watershed, currently 0.2% of the landscape is old-forest single structure, with an HRV of 10-20%. Even more alarming is that Dry Upland Forest is composed of .19% old forest single-story with an HRV of 40-65%. There is no old forest single-story currently present within the project area, vastly underserving the wildlife species that depend on mature, open stands of ponderosa pine.

Direct/Indirect Effects for Connectivity

ALTERNATIVE 1

In the absence of silviculture treatments to reduce tree stocking, canopy closure would continue to increase and trees would be subject to increased stress and competition for resources. Stands would be subjected to increased risks from wildfire, insects, and diseases that would kill trees in numbers and distribution that could adversely affect connectivity between patches of Old Forest habitat.

To forego prescribed burning, non-commercial thinning, and mechanical fuels reduction would perpetuate higher tree densities, higher fuels loading, ladder fuels, and tree species compositions that are not sustainable for the biophysical setting. These indirect effects would contribute to uncharacteristic insect, disease, and wildfire events. The effects of wide scale tree mortality from these disturbances would have a much greater adverse effect to connectivity than the prescribed treatments under Alternative 2. These adverse effects could render the Old Forest and connective corridors unsuitable for the wildlife species that depend on them as habitat.

ALTERNATIVE 2

Alternative 2 would reduce the canopy closure and structural complexity of treated stands in commercial stands, but non-commercial treatments would return old-forest single-story stands to the project area. This structural type is vastly underrepresented when compared to the HRV and many wildlife species depend on it.

Silvicultural prescriptions in connective corridor units would reduce competition between residual trees, increase tree growth rates, and increase trees' ability to defend against insects and diseases, while retaining levels of canopy closure and structural complexity to facilitate movement of wildlife between old-growth habitat patches. Fuel treatments will reduce the complexity of the stand but won't affect canopy cover in existing high canopy cover stands. Any treatment taking place in an identified connective corridor will maintain stand in the upper third of its site potential.

The effects of prescribed burning, non-commercial thinning, and commercial harvest would be immeasurable relative to the quality and function of connective corridors. Reducing stand density and complexity of old forest multi-story in order to convert it to historically-abundant old forest single-story still provides quality LOS habitat and connectivity. The action alternative would not measurably impact connectivity of LOS habitat.

References

Adams, E.M. and M.L. Morrison. 1993. Effects of forest stand structure and composition on Red-breasted Nuthatches and brown creepers. Journal of Wildlife Management 57:616-629.

Adamus, P.R., K. Larsen, G.Gillson, and C.R. Miller. 2001. Oregon Breeding Bird Atlas. Oregon Field Ornithologists, Eugene, OR. CD-ROM.

Ager, A.A., B.K. Johnson, J.W. Kern, anf J.G. Kie. 2003. Daily and seasonal movements and habitat use by female Rocky Mountain elk and mule deer. Journal of Mammology 84: 1076-1088.

Atlman, B. 2000. Conservation strategy for landbirds in the Northern Rockie Mountains of Eastern Oregon and Washington, Version 1. Oregon-Washington Partners in Flight: 140 pp.

Altman, B. and B. Bresson. 2017. Conservation of landbirds and associated habitats and ecosystems in the Northern Rocky Mountains of Oregon and Washington. Version 2.0. Oregon-Washington Partners in Flight (www.orwapif.org) and American Birds Conservancy and U.S. Forest Service/Bureau of Land Management.

Ammon, E.M. 1995. Lincoln's sparrow (*Melospiza lincolnii*). *In* A. Poole and F. Gill (editors), The Birds of North America, Number 135. The Birds of North America Incorporated, Philadelphia, PA.

Aubry, K.B. and C.M. Raley. 2002. The pileated woodpecker as a keystone habitat modifier in the Pacific Northwest. *In* Laudenslayer, W.F., Jr., P.J. Shea, B.E. Valentine, C.P. Weatherspoon, and T.E. Lisle, tech. eds. 2002. Proceedings of the symposium on the ecology and management of dead wood in western forests. Gen. Tech. Rep. PSW-GTR-181. PSW Research Stn, USDA Forest Service. 949 p.

Beckwith, R.C., and E. L. Bull. 1987. Scat analysis of the arthropod component of pileated woodpecker diet. The Murrelet 66: 90-92.

Bender, L.C. and J.G. Cook. 2005. Nutritional condition of elk in Rocky Mountain National Park. Western North American Naturalist 65: 329-334.

Bull, E.L. and E.C. Melsow. 1977. Habitat requirements of the Pileated Woodpecker in Northeastern Oregon. Journal of Forestry June: 335-337.

Bull, E.L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. Research Note PNW-444. USDA Forest Service, Pacific Northwest Research Station. 19p.

Bull, E. L. 1987. Ecology of the Pileated Woodpecker in Northeastern Oregon. J. Wildl. Manage. 51(2):472-481.

Bull, E. L., R. S. Holthausen, and M. G. Henjum. 1992. Roost Trees Used by Pileated Woodpeckers in Northeastern Oregon. J. Wildl. Manage. 56(4):786-793.

Bull, E. L. and R. S. Holthausen. 1993. Habitat Use and Management of Pileated Woodpeckers in Northeastern Oregon. The Journal of Wildlife Management, Vol. 57, No. 2 (Apr., 1993), pp. 335-345.

Bull, E. L., and J. H. Hohman. 1994. Breeding biology of northern goshawks in northeastern Oregon. Studies in Avian Biology 16:103-105.

Bull, E. L., D. G. Parks, and T. R. Torgersen. 1997. Trees and logs important to wildlife in the interior Columbia River Basin. Gen. Tech. Rep. PNW-GTR-391. USDA, Forest Service, Pacific Northwest Research Station. Portland, OR. 55p.

Bull, E.L. and T.W. Heater. 2000. Resting and denning sites of American martens in northeastern Oregon. Northwest Science 74(3):179-185.

Bull, E.L. and T.W. Heater. 2001. Home range and dispersal of the American marten in northeastern Oregon. Northwestern Naturalist 82: 7-11.

Bull, E.L., A.A. Clark, and J.F. Shepherd. 2005a. Short-term effects of fuel reduction on pileated woodpeckers in northeastern Oregon- a pilot study. Res. Pap. PNW-RP-564. Portland, OR. USDA Forest Service, Pacific Northwest Research Station. 17p.

Bull, E.L., T.W. Heater, and J.F. Shephard. 2005b. Habitat Selection by the American Marten in Northeastern Oregon. Northwest Science. Vol. 79 No. 1:37-43.

Bull, E. L., N. Nielsen-Pincus, B. C. Wales, and J. L. Hayes. 2007. The Influence of Disturbance Events on Pileated Woodpeckers in Northeastern Oregon. Forest Ecology and Management: 243 (2007) 320-329.

Buskirk, S.W. and R.A. Powell. 1994. Habitat ecology of American martens and fishers. In: Burkirk, S.W.; Harestad, A.; Raphael, M.; Powell, R.A., eds. Martens, sables and fishers: biology and conservation. Ithaca, NY: Cornell University Press: 283-296.

Calder W.A., and L.L. Calder. 1994. Calliope hummingbird (*Selasphorous calliope*). *In* A. Poole and F. Gill (editors), The Birds of North America, Number 135. The Birds of North America Incorporated, Philadelphia, PA.

Christianson, D.A. and S. Creel. 2007. A review of environmental factors affecting elk diets. The Journal of Wildlife Management 71:164-176.

Ciuti, S., J. M. Northrup, T. B. Muhly, S. Simi, M. Musiani, J. A. Pitt, M. S. Boyce. 2012. Effects of humans on behaviour of wildlife exceed those of natural predators in a landscape of fear. PLoS ONE 7: e50611. doi:10.1371/journal.pone.0050611

Cook, J.G., L.L. Irwin, L.D. Bryant, R.A. Riggs, J.W. Thomas. 1995. Relations of forest cover and condition of elk: A test of the thermal cover hypothesis in summer and winter.

Cook, J.G., L.L. Irwin, L.D. Bryant, R.A. Riggs, and J.W. Thomas. 1998. Relations of forest cover and condition of elk: a test of the thermal cover hypothesis in summer and winter. Wildlife Monographs 141: 3-61.

Cook, R., J. Cook, and P. Zager. 2005. Nutritional condition indices for elk: the good (and less good), the bad, and the ugly. Pp. 102-112 *in* Wisdom, M. J., technical editor, The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resource Conference, Alliance Communications Group, Lawrence, Kansas , USA.

Cook, J.G., R. C. Cook, R.W. Davis, and L. L. Irwin. 2016. Nutritional ecology of elk in summer and autumn in the Pacific Northwest. Wildlife Monographs 195:1-81.

Creel, S., J.E. Fox, A. Hardy, J. Sands, B. Garrot, and R.O. Peterson. 2002. Snowmobile activity and glucocorticoid stress response in wolves and elk. Conservation Biology 16:809-814.

Csuti, B., A. J. Kimerling, T. A. O'Neil, M. M. Shaughnessy, E. P. Gaines, and M. M. P. Huso. 2001. Atlas of Oregon wildlife: distribution, habitat, and natural history. Oregon State University Press, Corvallis, OR. 492p.

Dahms, W.G. 1949. How long do ponderosa pine snags stand? Research Notes, No. 57. Pacific Northwest Forest and Range Experiment Station. Deschutes Branch.

Daw, K., and S . DeStefano. 2001. Forest Characteristics of Northern Goshawk Nest stands and Post-Fledging Areas in Oregon. Journal of Wildlife Management. Vol. 65, No. 1 (Jan. 2001), pp. 59-65.

Everett, R., J. Lehmkuhl, R. Schellhaas, P. Ohlson, D. Keenum, H. Riesterer, and D. Spurbeck. 1999. Snag dynamics in a chronosequence of 26 wildfires on the east slope of the Cascade Range in Washington state, USA. International Journal of Wildland Fire 9: 223-234.

Faber, M. 2017. Diet overlap by DNA metabarcoding of mule deer, elk, and cattle in ponderosa pine forest of eastern Oregon. Thesis. Oregon State University, Corvallis, Oregon.

Finch, D.M. 1991. Population ecology, habitat requirements, and conservation of neotropical migratory birds. General Technical Report RM-205. US Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, Colorado.

Fisher, R.J. and K.L. Wiebe. 2006. Nest site attributes and temporal patterns of Northern Flicker nest loss: effects of predation and competition. Behavioural Ecology 147:744-753.

Harrod, R.J., W.L. Gaines, W.E. Hartl, and A. Camp. 1998. Estimating historical snag density in dry forests east of the Cascade Range. Gen. Tech. Rep. PNW-GTR-428. USDA, Forest Service, Pacific Northwest Research Station. Portland, OR. 16p.

Hessburg, P. F., and J. K. Agee. 2003. An environmental narrative of Inland Northwest U.S. forests, 1800–2000. Forest Ecology and Management 178:23–59.

Hobbs, N.T. 2003. Challenges and opportunities in integrating ecological knowledge across scales. Forestry Ecology and Management 181:223-238.

Hutto, R.L. 1995. Composition of bird comunities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9:1041-1058.

Johnston, J.D., C. J. Dunn, M. J. Vernon, J. D. Bailey, B. A. Morrissette, and K. E. Morici. 2018. Restoring historical forest conditions in a diverse inland Pacific Northwest landscape. Ecosphere):e02400. 10.1002/ecs2.2400

Keen, F.P. 1929. How soon do yellow pine snags fall? Journal of Forestry 27:735-737.

Keane, R. E., R. A. Loehman, L. M. Holsinger, D. A. Falk, P. Higuera, S. M. Hood, and P. F. Hessburg. 2018. Use of landscape simulation modeling to quantify resilience for ecological applications. Ecosphere 9:e02414. 10.1002/ecs2. 2414

Kelly, J.J., Q.S. Latif, V.A. Saab, and T.T. Veblen. 2018. Spruce beetle outbreaks guide American Three-toed Woodpecker *Picoides dorsalis* occupancy patterns is subalpine forests. Ibis 161:172-183.

Kennedy, P.L., J.M. Ward, G.A. Rinker, and J.A. Gessaman. 1994. Post-fledging areas in northern goshawk home ranges. Studies in Avian Biology 16:75-82.

Korol, J.J., M.A. Hemstrom, W.J. Hann, and R. Gravenmier. 2002. Snags and down wood in the Interior Basin Ecosystem Management Project. *In* Proceedings of the symposium on the Ecology and Management of Dead Wood. Gen. Tech. Rep. PSW-GTR-181. USDA, Forest Service, Pacific Southwest Research Station. 28p.

Lawler, J.L. and T.C. Edwards, Jr. 2006. A variance-decomposition approach to investigating multiscale habitat associations. The Condor 108:47-58.

Long, R.A., J.L. Rachlow, J.G. Kie, and M. Vavra. 2008. Fuels reduction in a western coniferous forest: Effects on quantity and quality of forage for elk. Rangeland Ecology and Management 61:302-313.

Marshall, D. B. 1992. Status of the Northern Goshawk in Oregon and Washington. Audubon Society of Portland, Portland, OR. 35p.

McGrath, M.T., S. DeStefano, R. A. Riggs, L. L. Irwin and G. J. Roloff. 2003. Spatially Explicit Influences on Northern Goshawk Nesting Habitat in the Interior Pacific Northwest. Wildlife Monographs No. 154:1-63.

Mellen-McLean, K., B.G. Marcot, J.L. Ohmann, K.Waddell, E.A. Willhite, S.A. Acker, S.A. Livingston, B.B. Hostetter, B.S. Webb, and B.A. Garcia. 2017. DecAID, the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 3.0. USDA Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; USDI Fish and Wildlife Service, Oregon State Office; Portland, Oregon. https://apps.fs.usda.gov/r6_decaid/views/index.html

Moriarty, K.M. 2014. Habitat use and movement behavior of Pacific Matren (*Martes caurina*) in response to forest management practices in Lassen National Forest, California. Thesis. Oregon State Universty, Corvallis, Oregon.

Parks, C.G., D.A. Conklin, L. Bednar, H. Maffei. 1999. Woodpecker use and fall rates of snags created by killing ponderosa pine infected with dwarf mistletoe. Res. Pap. PNW-RP-515. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 11pp.

Partners in Flight. 2010. Central Rocky Mountains physiographic area plan. Accessed online at: http://www.partnersinflight.org/bcps/pifplans.htm.

Penninger, M. and K. Keown. 2011a. American marten (Martes americana) indicator species assessment, Wallowa-Whitman National Forest. Unpublished report. 50 pp.

Penninger, M. and K. Keown. 2011b. Northern goshawk (Accipiter gentilis) management indicator species assessment, Wallowa-Whitman National Forest. Unpublished report. 54 pp.

Penninger, M. and K. Keown. 2011c. Pileated woodpecker (Drycopus pileatus) management indicator species assessment, Wallowa-Whitman National Forest. Unpublished report. 38 pp.

Ranglack, D. H., K. M. Proffitt, J. E. Canfield, J. A. Gude, J. Rotella, R. A. Garrott. 2017. Security areas for elk during archery and rifle hunting seasons. The Journal of Wildlife Management 81:778-791

Reynolds, R. T., and H. M. Wight. 1978. Distribution, density, and productivity of accipiter hawks breeding in Oregon. The Wilson Bulletin 90:182-198.

Reynolds, R.T. 1983. Management of western coniferous forest habitat for nesting Accipiter hawks. Gen. Tech. Report RM-102. USDA Forest, Rocky Mountain Forest and Range Experiment Station. 7 p.

Reynolds, R.T.; Graham, R.T.; Reiser, M.H.; Bassett, R.L.; Kennedy, P.L.; Boyce, D.A.; Goodwin, G.; Smith, R.; Fisher, E.L. 1992. Management recommendations for the northern goshawk in the southwestern United States. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, GTR-RM-217.

Reynolds, R.T., R.T. Graham, and D.A. Boyce, Jr. 2007. Northern Goshawk habitat: an interception of science, management, and conservation. Journal of Wildlife Management 72:1047-1055.

Rose, C.L., B.G. Marcot, T.K. Mellen, J.L. Ohmann, K.L. Waddell, D.L. Lindley, and B. Scbreiber. 2001. Decaying wood in Pacific Northwest forests: concepts and tools for habitat management. *In*

Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press, Corvallis, Oregon. pp. 580-623.

Rosemberg, K.V., Kennedy, J.A., Dettmers, R., Ford, R.P., Reynolds, D., Alexander, J.D., Beardmore, C.J., Blancher, C.J., Bogart, R.E., Butcher, G.S., Camfield, A.F., Couturier, A., Demarest, W., Easton, W.E., Giocomo, J.J., Keller, R.H., Mini, A.E., Panjabi, A.O., Pashley, D.N., Rich, T.D., Ruth, J.M., Stabins, H., Stanton, J., Will, T. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee. 119pp.

Rota, C.T., M.A, Rumble, C.P. Lehman, D.C. Kesler, and J.J. Millspaugh. 2015. Apparent foraging success reflects habitat quality in an irruptive species, the Black-Backed Woodpecker. The Condor 117:178-191.

Rowland, M.M., M.J. Wisdom, B.K. Johnson, and M.A. Penninger. 2005. Effects of roads on elk: implications for management in forested ecosystems. Pgs. 42-52 *in* Wisdom, M.J., tech. ed., The Starkey Project: a synthesis of long-term studies of elk and mule deer. Transactions of the North American Wildlife and Natural Resources Conference.

Saab, V.A. and J. Dudley. 1997. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. Research Paper RMRS-RP-11. 17 pp.

Saab, V.A., J. Dudley, and W.L. Thompson. 2004. Factors influencing occupancy of nest cavities in recently burned forests. The Condor 106:20-36.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2011. The North American Breeding Bird Survey, Results and Analysis 1966 - 2009. Version 3.23.2011 USGS Patuxent

Seavey, N.E., R.D. Burnett, and P.J. Taille. 2012. Black-backed Woodpecker nest-tree preference in burned forests of the Sierra Nevada, California. Wildlife Society Bulletin 36:722-728.

Spies, T. A., M. A. Hemstrom, A. Youngblood, and S. Hummel. 2006. Conserving old-growth forest diversity in disturbance-prone landscapes. Conservation Biology 20:351–362.

Squires, J. R. and P. L. Kennedy. 2006. Northern Goshawk Ecology: An Assessment of Current Knowledge and Information Needs for Conservation and Management. Studies in Avian Biology No. 31:8–62.

Thomas, J. W., ed. 1979. Wildlife habitats in managed forests: The Blue Mountains of Oregon and Washington. Agricultural Handbook No. 553. USDA Forest Service. Washington D.C. 512p.

Thomas, J.W., D.A. Leckenby, M. Henjum, R.J. Pederson, and L.D. Bryant. 1988. Habitat-Effectiveness Index for Elk on Blue Mountain Winter Range. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-218.

Toweill, D. E., and J. W. E. Thomas. 2002. North American elk: ecology and management. Smithsonian Institute Press, Washington, D.C., USA.

USDA Forest Service. 1990. Land and Resource Management Plan, Wallowa-Whitman National Forest. USDA, Forest Service, Pacific Northwest Region (R6), Wallowa-Whitman National Forest.

USDA Forest Service. 1993. Region 6 Interim Old Growth Definitions. USDA, Forest Service, Pacific Northwest Region (R6).

Wales, B. C., K. Mellen-McClean, W. L. Gaines and L. Suring. 2011. Focal species assessment of current condition and the proposed action (alternative B) for the Blue Mountains forest plan revision-DRAFT. Baker City, OR, Unpublished paper on file at: U.S. Department of Agriculture Forest Service, Wallowa-Whitman National Forest, Blue Mountain Forest Plan Revision.

Weibe, K.L. and E.A. Gow. 2013. Choice of foraging habitat by Northern Flicker reflects changes in availability of their ant prey linked to ambient temperature. Ecoscience 20:122-130.

Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A. Saab, D.C. Lee, W.J. Hann, T.D. Rich, M.M. Rowland, W.J. Murphy, and M.R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: Broad-scale trends and management implications, Vol. 2 – Group level results. Gen. Tech. Rep. Threatened and Endangered Species, Sensitive Species and Management Indicator Species and the level of analysis required. PNW-GTR-485.

Wisdom, M.J., B.K. Johnson, M. Vavra, J.M. Boyd, P.K. Coe, J.G. Kie, A.A. Ager, and N.J. Cimon. 2005. Cattle and elk responses to intensive timber harvest. Pp. 197-216 *in* Wisdom, M. J., technical editor, The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resource Conference, Alliance Communications Group, Lawrence, Kansas , USA.

Wisdom, M.J. and M.M. Rowland. 2020. Integrated Vegetation and Road Management for Desired Elk Distribution. Presentation. PNW Research Station.